APSA

Annual Meeting

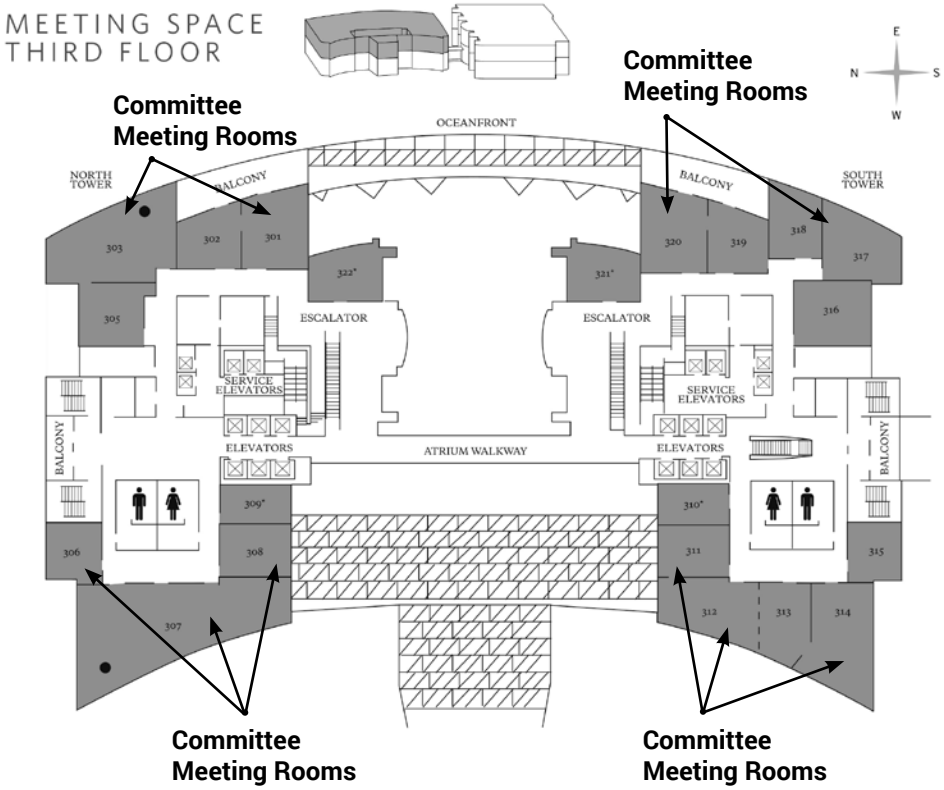
May 4–7, 2017

The Diplomat Beach Resort
Hollywood, FL USA

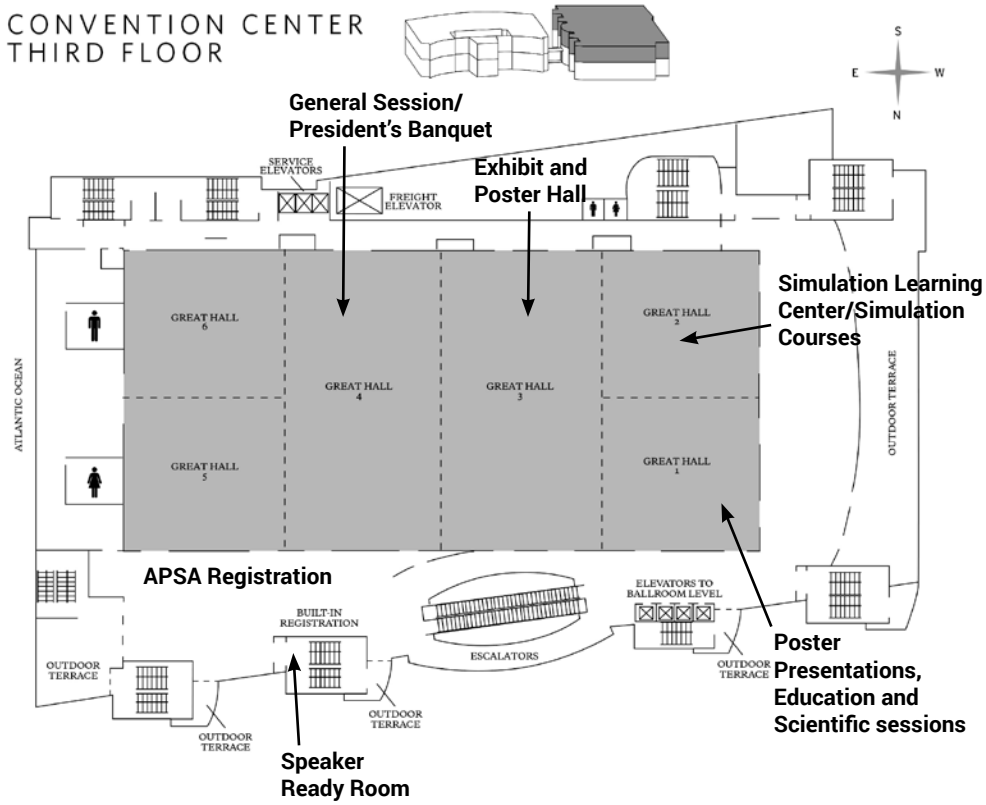
Final Program

eapsa.org

Diplomat Resort & Spa Floorplan

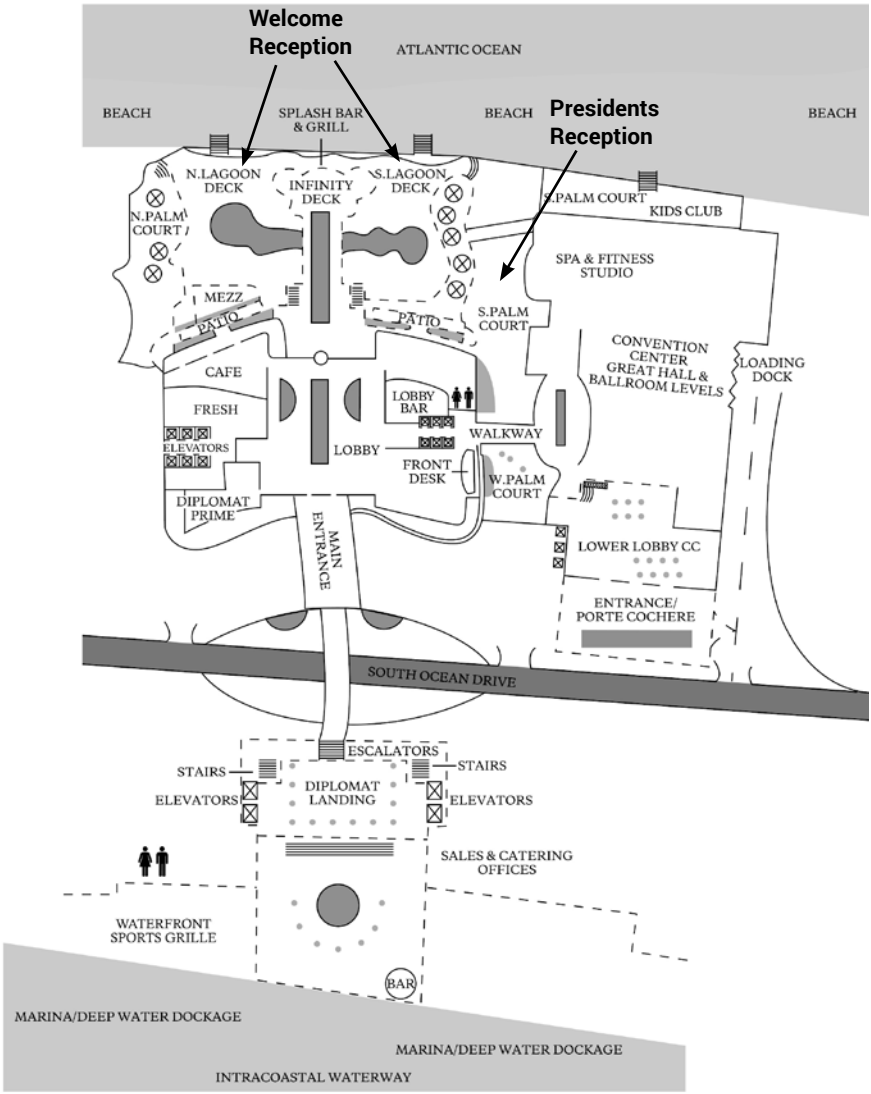


Diplomat Resort & Spa Floorplan



Diplomat Resort & Spa Floorplan

OUTDOOR PLANS
LOBBY LEVEL



American Pediatric Surgical Association Mission

To ensure optimal pediatric surgical care of patients and their families, to promote excellence in the field, and to foster a vibrant and viable community of pediatric surgeons.

We do this by:

- Developing and advocating for standards of care for infants and children and influencing public policy around the surgical care of children
- Encouraging discovery, innovation and improvement of care
- Providing rich venues for the dissemination of up-to-date knowledge
- Offering high quality continuing education to members
- Creating identity and community among pediatric surgeons
- Promoting a supportive health care environment for patients, staff and surgeons and making certain that it is sustained by economic health

American Pediatric Surgical Association
Administrative Offices
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Fax: +1-847-686-2253
eapsa@eapsa.org | www.eapsa.org

Lee Ann Clark
Executive Director
lclark@eapsa.org

Marina Petrulla
Administrative Director
mpetrulla@eapsa.org

Annie Cox
Administrator
acox@eapsa.org

Katherine Segreti
Administrator
ksegreti@eapsa.org

Liz Freyn
Conference Director
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Brenda Howe
Conference Registration and
Exhibits Manager
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Meagan Comerford
Marketing Communications Manager
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Kismet Saglam
Education Director
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Kyle Vermillion
Accountant
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Rita Wallace
Order Processing Specialist
rwallace@kellencompany.com

Go to the APSA website at www.eapsa.org and:

- Join the discussions on the All-Member Group
- Update your profile
- Connect with APSA colleagues

Table of Contents

Governance

Board of Governors 2016 – 2017

Diana L. Farmer
President
2016-2017
916-734-3190
dlfarmer@ucdavis.edu

Daniel von Allmen
Treasurer
2014-2017
513-636-7365
daniel.vonallmen@
cchmc.org

Henri R. Ford
President-Elect
2016-2017
323-361-2104
hford@chla.usc.edu

Gail E. Besner
Governor
2016-2019
614-722-3900
gail.besner@
nationwidechildrens.org

Mary E. Fallat
Immediate Past President
2016-2017
502-629-8638
mefall01@louisville.edu

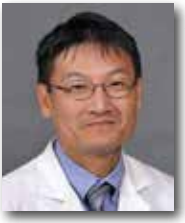
Rebecka L. Meyers
Governor
2015-2018
801-662-2950
rebecka.meyers@
imail2.org

John H.T. Waldhausen
Secretary
2015-2018
206-987-1177
john.waldhausen@
seattlechildrens.org

David J. Schmeling
Governor
2014-2017
(612) 285-7642
DJS1211@gmail.com

APSA Congratulates Incoming Board Members

Ronald B. Hirschl
President-Elect
2017-2018
734-764-6482
rhirschl@umich.edu



Mike K. Chen
Treasurer
2017-2020
205-638-9688
mike.chen@
childrensal.org

Jessica J. Kandel
Governor
2017-2020
773-702-6175
jkandel@surgery.bsd.
uchicago.edu

Past Presidents

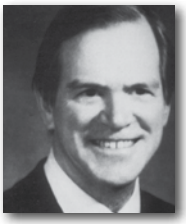
Robert E. Gross
1970-1971

Thomas M. Holder
1975-1976

C. Everett Koop
1971-1972

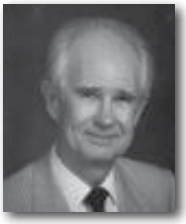
Alexander H. Bill
1976-1977

H. William Clatworthy, Jr.
1972-1973

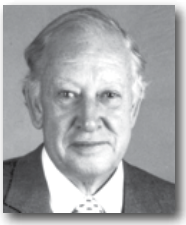


E. Thomas Boles, Jr.
1977-1978

Orvar Swenson
1973-1974



Morton M. Woolley
1978-1979



Harvey E. Beardmore
1974-1975

Robert G. Allen
1979-1980

Past Presidents (cont.)

Thomas V. Santulli
1980-1981

Dale G. Johnson
1985-1986

William B. Kiesewetter
1981

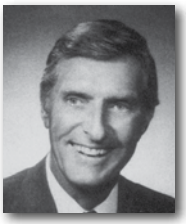
J. Alex Haller, Jr.
1986-1987

W. Hardy Hendren
1981-1983

Robert J. Izant, Jr.
1987-1988

Lester W. Martin
1983-1984

James A. O'Neill, Jr.
1988-1989



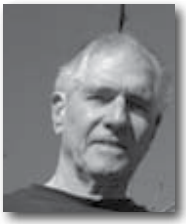
Judson G. Randolph
1984-1985

Eric W. Fonkalsrud
1989-1990

Past Presidents (cont.)

Robert M. Filler
1990-1991

Arvin I. Philippart
1995-1996



Alfred A. deLorimier
1991-1992

Keith W. Ashcraft
1996-1997

Dick G. Ellis
1992-1993

H. Biemann Othersen, Jr.
1997-1998

Raymond A. Amoury
1993-1994

Marc I. Rowe
1998-1999

Jay L. Grosfeld
1994-1995

Kathryn D. Anderson
1999-2000

Past Presidents (cont.)

David Tapper
2000-2001

M. Judah Folkman
2005-2006

Arnold G. Coran
2001-2002

Patricia K. Donahoe
2006-2007

R. Peter Altman
2002-2003

Moritz M. Ziegler
2007-2008

Bradley M. Rodgers
2003-2004

Michael R. Harrison
2008-2009

Robert J. Touloukian
2004-2005

Keith E. Georgeson
2009-2010

Past Presidents (cont.)

Marshall Z. Schwartz
2010-2011

Thomas M. Krummel
2013-2014

Robert C. Shamberger
2011-2012

Michael D. Klein
2014-2015

Keith T. Oldham
2012-2013

Mary E. Fallat
2015-2016

Past Officers

Secretary

Thomas M. Holder 1970–1973
Dale G. Johnson 1973–1976
James A. O'Neill, Jr. 1976–1979
Robert J. Touloukian. 1979–1982
Anthony Shaw 1982–1985
Raymond A. Amoury 1985–1988
Kathryn D. Anderson 1988–1991
Keith W. Ashcraft 1991–1994
Howard C. Filston. 1994–1997
Keith T. Oldham 1997–2000
Robert M. Arensman 2000–2003
Donna A. Caniano 2003–2006
Ronald B. Hirschl 2006–2009
Diana L. Farmer 2009–2012
Mary L. Brandt 2012–2015

Treasurer

Alfred A. deLorimier 1970–1972
Lucian L. Leape 1972–1975
Robert G. Allen. 1975–1978
Dick G. Ellis 1978–1981
J. Alex Haller, Jr. 1981–1984
Dick G. Ellis 1984–1987
William P. Tunell 1987–1990
Bradley M. Rodgers 1990–1993
Donald R. Cooney 1993–1996
Robert M. Arensman 1996–1999
Moritz M. Ziegler 1999–2002
Michael D. Klein 2002–2005
Neil J. Sherman 2005–2008
Dennis P. Lund 2008–2011
Charles J. Stolar. 2011-2014

Governor

Federico A. Arcari. 1970–1971
Robert J. Izant 1970–1972
Tague C. Chisholm 1971–1973
Robert G. Allen. 1972–1974
Morton M. Woolley 1973–1975
Marc I. Rowe 1974–1976
George W. Holcomb, Jr 1975–1977
Eric W. Fonkalsrud 1976–1978
Dale G. Johnson. 1977–1979
Lester W. Martin 1978–1980
Bernard J. Spencer 1979–1981
Harry C. Bishop 1980–1982
Judson G. Randolph 1981–1983
Robert M. Filler. 1981–1984
Keith W. Ashcraft 1982–1985
Alfred A. deLorimier 1983–1986

Past Officers (cont.)

Jay L. Grosfeld 1984–1987
Robert T. Soper 1985–1988
H. Biemann Othersen, Jr 1986–1989
Robert J. Touloukian. 1987–1990
Arvin I. Philippart 1988–1991
Albert W. Dibbins 1989–1992
Patricia K. Donahoe 1990–1993
Arnold G. Coran 1991–1994
Moritz M. Ziegler 1992–1995
David Tapper 1993–1996
Eugene S. Wiener. 1994–1997
Samuel H. Kim 1995–1998
R. Peter Altman 1996–1999
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Richard G. Azizkhan. 1998–2001
Thomas M. Krummel 1999–2002
Keith E. Georgeson 2000–2003
Marshall Z. Schwartz 2001–2004
John Noseworthy 2002–2005
George W. Holcomb, III 2003–2006
Kurt D. Newman. 2004–2007
Thomas F. Tracy 2005–2008
Robert C. Shamberger 2006–2009
Mary E. Fallat 2007–2010
Henri R. Ford 2008–2011
Fredrick J. Rescorla 2009–2012
Brad W. Warner 2010–2013
Kevin P. Lally. 2011-2014
Erik D. Skarsgard 2012–2015
Marleta Reynolds 2013-2016

APSA Representatives

APSA members volunteer and hold positions within many professional organizations worldwide, and we commend their dedication to advancing the field of pediatric surgery. The list below consists of those representatives who have been elected, nominated or otherwise appointed by the APSA Board of Governors. We appreciate their time serving as official APSA representatives.

Alliance for Childhood Cancer

Anthony D. Sandler

American Academy of Orthopaedic Surgeons

Writing panel of the Appropriate Use Criteria for Pediatric Supracondylar Humerus Fractures
Fizan Abdullah

Review panel of the Appropriate Use Criteria for Pediatric Supracondylar Humerus Fractures
Sara K. Rasmussen

American Academy of Pediatrics

SoSu Smart Tots Operations
Brian Kenney

American Board of Surgery

Marjorie J. Arca

Pediatric Surgery Board

John H.T. Waldhausen

American College of Radiology

Appropriateness Criteria Panel
Richard A. Falcone, Jr.

American College of Surgeons

Quality Assurance – Trauma
Joseph J. Tepas, III

Advisory Council for Pediatric Surgery Specialty Society Representative
Robert Sawin

Young Surgeon Representative
Robert T. Russell

Board of Governors
Brad W. Warner

Central Line Task Force
Gary E. Hartman

Commission on Cancer
Kenneth W. Gow

American Medical Association

Relative Value Update Committee (RUC)
Samuel D. Smith

RUC Advisor
Brendan T. Campbell

RUC Advisor Alternate
Samuel D. Smith

National Institute of Child Health and Human Development

National Advisory Committee
Charles S. Cox, Jr.

Trauma Center Association of America

Pediatric Committee
Michael L. Nance

Venous Access: National Guideline and Registry Development
Patrick J. Javid

APSA Committees 2016–2017

Audit
Peter W. Dillon, *Chair* 2015-2017
pdillon1@hmc.psu.edu
Michael J. Allshouse, *Vice Chair* 2015-2017
Brendan T. Campbell, 2015-2018
Philip L. Glick, 2016-2019
Dennis P. Lund, 2016-2019
William Middlesworth, 2016-2019
Edward P. Tagge, 2015-2018
Charles J. Stolar, *Ex Officio*

Bylaws
Henri R. Ford, *Chair* 2016-2017
hford@chla.usc.edu
Adam C. Alder, 2016-2019
Christopher P. Coppola, 2015-2018
Paul D. Danielson, 2016-2019
Peter F. Ehrlich, 2016-2019
Romeo C. Ignacio, Jr., 2014-2017
Grace Mak, 2014-2017
Daniel J. Ostlie, 2014-2017
Jacqueline M. Saito, 2014-2017
David T. Schindel, 2015-2018
Sandra S. Tomita, 2015-2018

Cancer
Max R. Langham, Jr., *Chair* 2015-2017
mlangham@uthsc.edu
Roshni A. Dasgupta, *Vice Chair* 2015-2017
Shahab F. Abdessalam, 2016-2019
Mary T. Austin, 2016-2019
Bill Chiu, 2014-2017
John M. Draus, Jr., 2014-2017
Todd E. Heaton, 2015-2018
Mary Beth Madonna, 2015-2018
Marcus M. Malek, 2016-2019
Joseph T. Murphy, 2015-2018
Jaimie D. Nathan, 2015-2018
Erika Newman, 2014-2017
Rebecca Stark, 2016-2018
Sanjeev A. Vasudevan, 2014-2017
Brent R. Weil, 2016-2018
Rebecka L. Meyers, *Ex Officio*

Childhood Obesity
Mark J. Holterman, *Chair* 2016-2018
mark.j.holterman@osfhealthcare.org
Joy Collins, *Vice Chair* 2016-2018
Jeremy T. Aidlen, 2016-2019
Patrick C. Bonasso, 2015-2018
Allen F. Browne, 2014-2017
Mike K. Chen, 2015-2018
Daniel DeUgarte, 2011-2017
Mohammad Emran, 2014-2017
Robert Carr Kanard, 2016-2019
Bradley C. Linden, 2011-2017
Evan P. Nadler, 2016-2019
Holly L. Neville, 2014-2017
Ann O'Connor, 2014-2017
Samir R. Pandya, 2014-2017
Kirk W. Reichard, 2015-2018
Elizabeth J. Renaud, 2014-2017
Beth Walford, 2016-2019
Mark L. Wulkan, 2015-2018
Jeffrey L. Zitsman, 2016-2019

Education
Marjorie J. Arca, *Chair* 2015-2018
marca@chw.org
Steven L. Lee, *Vice Chair* 2015-2018
Katherine A. Barsness, 2014-2017
Elizabeth A. Beierle, 2013-2019
Kathryn Q. Bernabe, 2015-2018
Pavan Brahmamdam, 2016-2018
Matias Bruzoni, 2016-2019
Casey M. Calkins, 2015-2018
Diana L. Diesen, 2016-2019
Colleen M. Fitzpatrick, 2014-2017
Kenneth W. Gow, 2011-2017
Shinjiro Hirose, 2016-2019
John D. Horton, 2015-2018
Eunice Y. Huang, 2015-2018
Romeo C. Ignacio, Jr., 2013-2019
Rodrigo B. Interiano, 2014-2017
Joseph A. Iocono, 2008-2017
Charles M. Leys, 2015-2018
Andrea Yan-Sin Lo, 2016-2019
Harold N. Lovvorn, III, 2016-2019
Grace Mak, 2016-2019
Andreas H. Meier, 2008-2017
Biren P. Modi, 2014-2017
Hannah G. Piper, 2015-2018
David M. Powell, 2014-2017
Wolfgang Stehr, 2014-2017
Jill S. Whitehouse, 2015-2018
Jill M. Zalieckas, 2015-2018

APSA Committees 2016–2017 (cont.)

CME Subcommittee
David M. Powell, *Chair* 2009-2017
dmpowellmd@gmail.com

Patient and Family Subcommittee
Romeo C. Ignacio, Jr., *Chair* 2015-2019
rcignacio@yahoo.com
Hannah G. Piper, 2015-2018

PSSAP Subcommittee
Craig W. Lillehei, *Co-chair* 2017-2022
craig.lillehei@childrens.harvard.edu
David M. Powell, *Co-chair* 2009-2017
dmpowellmd@gmail.com
Charles L. Snyder, *Co-chair* 2017-2023
csnyder@cmh.edu
Marjorie J. Arca, 2012-2018
Robert A. Cusick, 2015-2021
Saleem Islam, 2015-2020
Daniel J. Ledbetter, 2014-2020
Steven L. Lee, 2016-2021
Rebecka L. Meyers, 2014-2019
Erik D. Skarsgard, 2017-2022

Simulation Subcommittee
Katherine A. Barsness, *Chair* 2014-2017
kbarsness@luriechildrens.org
John D. Horton, 2015-2018
Joseph A. Iocono, 2011-2017
Andreas H. Meier, 2011-2017
Biren P. Modi, 2014-2017
David M. Powell, 2011-2017
Jill M. Zalieckas, 2015-2018

Student and Resident Education Subcommittee
Joseph A. Iocono, *Chair* 2012-2017
jiocono@uky.edu
Kenneth W. Gow, 2013-2017
Andreas H. Meier, 2014-2017

Ethics and Advocacy
Erin E. Rowell, *Chair* 2015-2018
erowell@luriechildrens.org
Deborah S. Loeff, *Vice Chair* 2015-2018
John F. Bealer, 2015-2018
Daniel A. Beals, 2015-2018
Arthur Cooper, 2015-2018
Mauricio A. Escobar, Jr., 2015-2018
Jeremy G. Fisher, 2015-2018
Richard D. Glick, 2015-2018
Patrick J. Javid, 2016-2019
Sidney Johnson, 2016-2019
Sarah A. Jones-Sapienza, 2015-2018
Fawn C. Lewis, 2014-2017
William Middlesworth, 2016-2019
Claudia M. Mueller, 2013-2019
Konstantinos Papadakis, 2016-2019
Robert L. Weinsheimer, 2014-2017
Aviva L. Katz, *Ex Officio*

Fetal Diagnosis and Treatment
Terry L. Buchmiller, *Chair* 2016-2018
terry.buchmiller@childrens.harvard.edu
Shinjiro Hirose, *Vice Chair* 2016-2018
N. Scott Adzick, 2014-2017
Loren Berman, 2015-2018
Stephen J. Fenton, 2015-2018
Cynthia A. Gingalewski, 2015-2018
Corey W. Iqbal, 2014-2017
Shaun M. Kunisaki, 2014-2017
Rony Marwan, 2016-2019
Oliver J. Muensterer, 2015-2018
Zaria C. Murrell, 2015-2018
Erin E. Perrone, 2016-2018
Avraham Schlager, 2016-2019
Charles J. Smithers, 2016-2019
Kathleen Van Leeuwen, 2014-2017

Global Pediatric Surgery
Ai-Xuan L. Holterman, *Chair* 2016-2018
aixuan.l.holterman@
osfhealthcare.org
J. Ted Gerstle, *Vice Chair* 2016-2018
Georges Azzie, 2012-2018
Amina M. Bhatia, 2014-2017
Marilyn W. Butler, 2016-2019
Daniel DeUgarte, 2015-2018
Tamara Fitzgerald, 2016-2019
Philip K. Frykman, 2016-2019
Michael Ganey, 2015-2018
Erik N. Hansen, 2016-2019
Sanjay Krishnaswami, 2016-2019
Monica Langer, 2015-2018
Harold N. Lovvorn, III, 2014-2017
Donald E. Meier, 2014-2019
Zaria C. Murrell, 2016-2019
Nathan M. Novotny, 2015-2018
Benedict C. Nwomeh, 2012-2018
Doruk E. Ozgediz, 2012-2019
Robin T. Petroze, 2017-2018
David H. Rothstein, 2015-2018
Julie Sanchez, 2015-2018
Marshall M. Stone, 2015-2018

APSA Committees 2016–2017 (cont.)

Diana L. Farmer, *Ex Officio*
Keith T. Oldham, *Ex Officio*

Healthy Policy and Advocacy

Max R. Langham, Jr., *Chair* 2015-2017
mlangham@uthsc.edu
Marion C. Henry, *Vice Chair* 2015-2017
Kathryn D. Bass, 2016-2019
Alana Beres, 2015-2017
David P. Bliss, Jr., 2015-2018
Kendra G. Bowman, 2015-2017
Mike K. Chen, MD, 2016-2019
Aviva L. Katz, 2015-2018
Dennis P. Lund, 2015-2017
J. Duncan Phillips, 2015-2018
Holly L. Williams, 2015-2017
Patrick V. Bailey, *Ex Officio*
Mary E. Fallat, *Ex Officio*
Charles D. Vinocur, *Ex Officio*

History Ad Hoc

Moritz M. Ziegler, *Co-Chair*
mmzieglermd@aol.com
Louis M. Marmon, *Co-Chair*
lmarmon@childrensnational.org
William T. Adamson
Philip L. Glick
Dale G. Johnson
Michael D. Klein
Rebecka L. Meyers
Don K. Nakayama
David M. Powell
Robert C. Shamberger
Diana L. Farmer, *Ex Officio*

Women in Pediatric Surgery Subcommittee

Kathryn D. Bass
Mary E. Fallat
Danielle S. Walsh

Industry Advisory

Marc P. Michalsky, *Chair* 2014-2017
marc.michalsky@
nationwidechildrens.org
Karen A. Diefenbach, *Vice Chair*
2013-2017
Katherine A. Barsness, 2014-2017
Mike K. Chen, 2014-2017
Matthew S. Clifton, 2014-2017
Carroll M. Harmon, 2016-2019
Thomas H. Inge, 2016-2019
Sang Lee, 2015-2018
Marc A. Levitt, 2017-2019
Richard H. Pearl, 2016-2019
David E. Sawaya, Jr., 2015-2018
Steven Teich, 2016-2019

Informatics Committee

Todd A. Ponsky, *Chair* 2015-2017
tponsky@gmail.com
Benedict C. Nwomeh, *Vice Chair*
2015-2017
Gudrun Aspelund, 2014-2017
Mary L. Brandt, 2016-2019
Nicholas E. Bruns, 2015-2018
David G. Darcy, 2017-2018
Belinda Dickie, 2016-2019
Jason C. Fisher, 2014-2017
Samir K. Gadepalli, 2016-2019
Ian C. Glenn, 2017-2018
Matthew T. Harting, 2013-2019
Eugene S. Kim, 2016-2019
Eric L. Lazar, 2016-2019
Aaron Payne Lesher, 2016-2019
Francois I. Luks, 2016-2019
Samir R. Pandya, 2016-2019
Steven S. Rothenberg, 2013-2019
Oliver S. Soldes, 2015-2018
Sohail R. Shah, 2015-2017
Bethany J. Slater, 2016-2019
Charles L. Snyder, 2014-2017
Edward P. Tagge, 2016-2019

Social Media Subcommittee

Eric L. Lazar, *Chair*
2016-2019
Gudrun Aspelund, 2014-2017
Mary L. Brandt, 2016-2019
Jason C. Fisher, 2014-2017
Samir K. Gadepalli, 2016-2019
Ian C. Glenn, 2017-2018
Eugene S. Kim, 2016-2019
Francois I. Luks, 2016-2019
Oliver S. Soldes, 2015-2018
Bethany J. Slater, 2016-2019
Edward P. Tagge, 2016-2019

APSA Committees 2016–2017 (cont.)

Telemedicine/Telementoring Subcommittee
Sohail R. Shah, *Chair* 2015-2017
Belinda Dickie, 2016-2019
Matthew T. Harting, 2013-2019
Aaron Payne Lesher, 2016-2019
Samir R. Pandya, 2016-2019
Charles L. Snyder, 2014-2017

Membership and Credentials
Harry Applebaum, *Chair* 2015-2017
happlebaum@mednet.ucla.edu
Robert A. Cowles, *Vice Chair* 2015-2017
Obinna O. Adibe, 2015-2018
Nicole M. Chandler, 2015-2018
Paul D. Danielson, 2016-2019
Jeffrey W. Gander, 2015-2018
Loretto A. Glynn, 2012-2018
Tarun Kumar, 2014-2017
Troy A. Markel, 2016-2019
Kevin P. Mollen, 2015-2018
Richard H. Pearl, 2010-2019
Ravi S. Radhakrishnan, 2015-2018
Samuel Z. Soffer, 2016-2019
Shawn Jason Stafford, 2015-2018

New Technology
Erik D. Skarsgard, *Chair* 2015-2017
eskarsgard@cw.bc.ca
Sean J. Barnett, *Vice Chair* 2015-2017
Anthony DeRoss, 2016-2019
Ian C. Glenn, 2015-2018
Harsh Grewal, 2013-2018
Marcus Jarboe, 2012-2018
Aviva L. Katz, 2015-2018
Sunghoon Kim, 2015-2018
Hanmin Lee, 2014-2017
Mikael Petrosyan, 2016-2019
Dorothy V. Rocourt, 2016-2019
Mark L. Saxton, 2016-2019
Stefan Scholz, 2014-2017
Bethany J. Slater, 2015-2018
Edmund Yi-Bin Yang, 2016-2019
Osnat Zmora-Beloosesky, 2015-2018

Nominating
Elizabeth A. Beierle, *Chair* 2016-2017
elizabeth.beierle@childrensal.org
Michael G. Caty, 2016-2017
Mary E. Fallat, 2016-2019
Michael D. Klein, 2015-2018
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Max R. Langham, Jr., 2016-2017
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KuoJen Tsao, 2016-2017

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Karen A. Diefenbach, 2015-2018
Robert L. Gates, 2015-2018
Ankush Gosain, 2016-2019
Julia E. Grabowski, 2014-2017
Yigit S. Guner, 2016-2019
Tim Jancelewicz, 2014-2017
Akemi L. Kawaguchi, 2016-2019
Dave R. Lal, 2015-2018
Tolu Oyetunji, 2016-2018
Robert L. Ricca, Jr., 2016-2019
Julia S. Shelton, 2015-2018
Stig Somme, 2016-2019
Lan T. Vu, 2016-2019
Regan F. Williams, 2014-2017
Saleem Islam, *Ex Officio*
KuoJen Tsao, *Ex Officio*

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John H.T. Waldhausen

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John C. Bleacher, 2015-2018
John C. Densmore, 2014-2017
John J. Doski, 2012-2018
Michael J. Goretsky, 2014-2017
Donavon Hess, 2014-2017
Stephen S. Kim, 2016-2019
Stephen G. Kimmel, 2016-2019
Evan R. Kokoska, 2016-2019
Clifford C. Marr, 2016-2019
David M. Notrica, 2016-2019
Kyriacos Panayides, 2015-2018
Samir R. Pandya, 2015-2018
Ravi S. Radhakrishnan, 2015-2018
Jose H. Salazar, 2015-2018
David J. Schmeling, 2013-2019
Robert D. Schlechter, 2015-2018
Stephen B. Shew, 2014-2017
Samuel D. Smith, 2014-2017
Mark C. Stovroff, 2016-2019
Douglas Y. Tamura, 2015-2018
David E. Wesson, 2014-2017
Brendan T. Campbell, *Ex Officio*

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Catherine C. Chen, 2014-2017
Richard A. Falcone, Jr., 2016-2019
Elizabeth Fialkowski, 2016-2019
Anne C. Fischer, 2015-2018
Gerald Gollin, 2014-2017
Michael J. Goretsky, 2016-2019
Andre Hebra, 2012-2018
Eugene S. Kim, 2014-2017
Shaun M. Kunisaki, 2015-2018
Aaron M. Lipskar, 2016-2019
Troy A. Markel, 2015-2018
Sean E. McLean, 2015-2018
Peter S. Midulla, 2014-2017
Michael J. Morowitz, 2015-2018
David A. Rodeberg, 2015-2018
Samuel Z. Soffer, 2014-2018
Shawn D. St. Peter, 2015-2018

Publications

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Mary J. Edwards, *Vice Chair* 2015-2018
Mary T. Austin, 2015-2018
Darrell L. Cass, 2015-2018
David M. Gourlay, 2014-2017
Eunice Y. Huang, 2014-2017
Catherine J. Hunter, 2015-2018
Cassandra M. Kelleher, 2015-2018
Francois I. Luks, 2015-2018
Jed G. Nuchtern, 2016-2019
Adam M. Vogel, 2016-2019
Kasper Wang, 2015-2018
Edmund Yi-Bin Yang, 2014-2017

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Martin L. Blakely
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Charles S. Cox, Jr.
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Robert D. Acton, 2015-2018
Pablo Aguayo, 2015-2018
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Mary K. Arbuthnot, 2015-2017
Kelly M. Austin, 2012-2017
Michael W. Dingeldein, 2016-2019
J. Craig Egan, 2015-2018
Alexander Feliz, 2015-2018
David Juang, 2012-2017
Denise B. Klinkner, 2015-2018
Christopher R. Newton, 2016-2019
Robert L. Ricca, Jr., 2014-2017
David H. Rothstein, 2014-2017
Ana Ruzic, 2015-2018

APSA Committees 2016–2017 (cont.)

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Belinda Dickie, 2015-2018
Emily T. Durkin, 2015-2018
Annie H. Fecteau, 2016-2019
Helene Flageole, 2015-2018
Katherine Theresa Flynn-O'Brien, 2015-2018
Richard D. Glick, 2016-2019
Stephanie A. Kapfer, 2015-2018
Anne C. Kim, 2015-2018
Damian R. Maxwell, 2016-2019
Lisa E. McMahon, 2015, 2018
Peter C. Minneci, 2014-2017
Jessica L. Roybal, 2016-2019
Elizabeth J. Renaud, 2016-2019
Daniel K. Robie, 2014-2017
Jacqueline M. Saito, 2016-2019
Joel Shilyansky, 2015-2018
David E. Skarda, 2014-2017
Patricia A. Valusek, 2014-2017
Kristen A. Zeller, 2016-2019
Cynthia D. Downard, *Ex Officio*
Kurt F. Heiss, *Ex Officio*
Shawn J. Rangel, *Ex Officio*
Joseph J. Tepas, III, *Ex Officio*

Quality Award Subcommittee

Peter C. Minneci, *Co-chair* 2014-2017
David E. Skarda, *Co-chair* 2014-2017
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Lisa E. McMahon, 2015-2018
Joel Shilyansky, 2015-2018
Melvin S. Dassinger, III, 2015-2018
Belinda Hsi Dickie, 2015-2018

Trauma

David M. Gourlay, *Chair* 2015-2017
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Reto M. Baertschiger, 2016-2019
Duane S. Duke, 2015-2018
Vincent P. Duron, 2016-2019
Brett W. Engbrecht, 2014-2017
Mauricio A. Escobar, Jr., 2016-2019
David L. Gibbs, 2013-2019
Harsh Grewal, 2016-2019
Jeffrey H. Haynes, 2014-2017
Mubeen Jafri, 2014-2017
Ramin Jamshidi, 2016-2018
Nathaniel S. Kreykes, 2014-2017
Shawn D. Larson, 2015-2018
Robert W. Letton, Jr., 2015-2018
Bindi Naik-Mathuria, 2012-2018
Isam W. Nasr, 2015-2018
Mitchell R. Price, 2016-2019
Jose M. Prince, 2015-2018
Carmen T. Ramos, 2016-2019
Robert T. Russell, 2016-2019
Anthony Stallion, 2016-2019
Jacob T. Stephenson, 2016-2019
Dylan Stewart, 2015-2018
Steven Stylianos, 2014-2017
Adam M. Vogel, 2016-2019
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Workforce

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Stephen P. Dunn, *Vice Chair* 2016-2018
Samuel M. Alaish, 2016-2019
Adela Casas-Melley, 2016-2019
Graham H. Cosper, 2016-2019
James C. Y. Dunn, 2014-2017
Cynthia A. Gingalewski, 2014-2017
Richard J. Hendrickson, 2016-2019
Frieda Marie Hulka, 2015-2018
Sarah A. Jones-Sapienza, 2016-2019
Danny C. Little, 2015-2018
P. Cameron Mantor, 2014-2017
Louis M. Marmon, 2014-2017
Abigail E. Martin, 2015-2018
Allen L. Milewicz, 2015-2018
Stacey Moore-Olufemi, 2015-2018
Sara K. Rasmussen, 2015-2018
Richard G. Weiss, 2012-2018

Transplantation Subcommittee

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Stephen P. Dunn, 2015-2018

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APSA Foundation

APSA FOUNDATION ENRICHMENT GRANTS

Supporting Young Pediatric Surgeon-Scientists

In 1991, a small group of APSA members led by Dr. Albert H. Wilkinson, Jr., of Jacksonville, Florida, discussed establishing a foundation for APSA to foster support for scientific investigation in the field of children's surgery. Twenty-one years later, the APSA Foundation has provided Annual Enrichment Grants to more than 30 young pediatric surgeon-scientists. The return on investment has been extraordinary! This is a singular legacy for Dr. Jay Grosfeld, who served for twenty years as Chair. We mourn his untimely passing this past fall.

With the election of Dr. Thomas Krummel as Chair, the APSA Foundation continues to invest in the future of pediatric surgery through its grant programs – not only in the United States and Canada, but throughout the world by supporting the Travel Fellow program. In 2016 the Foundation, together with APSA, extended its support to other international pursuits in an effort to identify and address children's surgical needs throughout the resource-poor countries in the world. Over its lifetime, the Foundation has raised more than $1,000,000 in donations and provided almost $700,000 in research grants. Fifty percent of APSA members have donated to the Foundation over the years.

Visit the APSA Foundation booth in the Exhibit Hall to speak with Dr. Krummel and other members of the APSA Foundation Board about the direction of the organization and future plans. Thank you for all you do for pediatric surgery and especially for what your next gift to the APSAF can achieve in the future!

The APSA Foundation Board of Directors
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John H.T. Waldhausen, *Secretary*
Daniel von Allmen, *Treasurer*
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Jessica J. Kandel
Michael D. Klein
Max R. Langham, Jr.
David E. Wesson

***Ex Officio* Member**
Diana L. Farmer

APSA Foundation Grant Recipients

Your tax-exempt contributions to APSAF have energized young and deserving pediatric surgeons to become some of the leading surgeon-scientists of the future.

2016

Helen Hsieh, MD
Effect of Midazolam on the Developmental and Maturation of Hippocampal Neuronal Circuitry
$25,000

Elisabeth T. Tracy, MD
Bleeding and Thrombosis in Infants and Children
$25,000

2015

William H. Peranteau, MD
In Utero Hematopoietic Cell Transplantation for the Treatment of Congenital Disorders
$25,000

Bradley J. Segura, MD
The Role of Enteric Glia in Pediatric Intestinal Inflammation
$25,000

2014

Hannah G. Piper, MD
The Role of Intestinal Microbiota in Children with Intestinal Failure and Bacterial Overgrowth
$25,000

David Stitelman, MD
In Utero Delivery of Synthetic Nanoparticles for Gene Editing in the Central Nervous System
$25,000

2013

Ankush Gosain, MD
Splenic Neurovascular Units in Hirschsprung's Associated Enterocolitis
$25,000

David M. Gourlay, MD
IAP Prevents Intestinal Inflammation in the Newborn Intestine
$25,000

Shawn D. Larson, MD
Inflammasome Activation is Critical for Neonatal Emergency Myelopoiesis and Expansion of Hematopoietic Stem Cells for Inflammation
$25,000

2012

Harold N. Lovvorn, III, MD
Induced Pluripotent Stem Cells for the Study of Wilms' Tumorigenesis
$25,000

KuoJen Tsao, MD
Errors and Adverse Events in the Setting of the Neonatal Surgery Performed in the NICU
$25,000

APSA Foundation Grant Recipients (cont.)

2011
Shaun M. Kunisaki, MD
Mesenchymal Stem Cell Regulation of Fetal Lung Development in Diaphragmatic Hernia
$25,000

Peter F. Nichol, MD
Using a Genetic Model of Duodenal Atresia to Understand Regenerative Mechanisms within the Intestine
$25,000

2010
Cynthia D. Downard, MD
Control of Intestinal Microcirculation in NEC
$25,000

Cassandra M. Kelleher, MD
Extracellular Components Critical to Alveolarization: Contributions of Elastin
$25,000

2009
Tippi C. MacKenzie, MD
Maternal Immune Response *In Utero* Hematopoietic Stem Cell Transplantation
$25,000

Kelly A. Miller, MD
The Pathogenic Role of Enteric Glia in Hirschsprung's Enterocolitis
$25,000

2008
Douglas N. Miniati, MD
Role of Notch4 Signaling in Aberrant Pulmonary Vascular Development
$25,000

2007
Allan M. Goldstein, MD
Role of Sonic Hedgehog in Enteric Nervous System Development
$25,000

2006
James C.Y. Dunn, MD
Enteric Nervous System Regeneration for Hirschsprung's Disease
$25,000

2005
Elizabeth A. Beierle, MD
Focal Adhesion Kinase and Vascular Endothelial Growth Factor Receptor-3 in Human Neuroblastoma
$10,000

Kerilyn K. Nobuhara, MD
Intestinal Dysmotility in Fetal Repair of Gastroschisis
$10,000

APSA Foundation Grant Recipients (cont.)

2004
Karl G. Sylvester, MD
Liver Regeneration and Stem Cell Regulation via the WNT Signaling Pathway
$10,000

Christopher K. Breuer, MD
Do Tissue Engineered Venous Conduits Grow? Investigating the Growth Potential of Tissue Engineered Venous Conduits in a Juvenile Lamb Model
$10,000

2003
Peter F. Ehrlich, MD
Injury Prevention through Brief Intervention: A Novel Approach to Pediatric Injury Prevention
$10,000

2002
Mary Beth Madonna, MD
Growth Factor Receptor Signaling and its Relationship to Cell Proliferation and Differentiation in a Neuroblastoma Cell Line
$10,000

2001
Anthony Stallion, MD
Intestinal Ischemia Reperfusion Injury Contributes to the Initiation of the Systemic Inflammatory Response Syndrome
$10,000

2000
Edward M. Barksdale, Jr., MD
The Therapy of Neuroblastoma-induced Disorders of Dendropoiesis of Dendritic Cell Development
$10,000

1999
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Evidence-Based Guidelines for Resource Utilization in Pediatric Spleen/Liver Injury
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Aviva L. Katz, MD - 2010
Dennis P. Lund, MD - 2009
George W. Holcomb, III, MD - 2008

APSA/Association of Pediatric Surgery Training Program Directors M. Judah Folkman Memorial Award

2016
Basic Science
Megan Berger, MD
Outcomes of Total Pancreatectomy and Islet Autotransplantation in Young Children

Clinical Science
Simone Langness, MD
Low D-Dimer Predicts the Absence of Intracranial Hemorrhage in Pediatric Blunt Head Trauma

2015
Basic Science
Baddr A. Shakhsheer, MD
Host and Bacterial Factors Cooperatively Disrupt Healing of Intestinal Anastomoses

Clinical Science
Barrett P. Cromeens, DO, PhD
Implementation of a Pediatric Surgical Quality Improvement (QI)-Directed M&M Conference

Award Recipients (cont.)

2014
Basic Science
Connie H. Keung, MD
Propranolol as a Novel Therapy for Lymphatic Malformations

Clinical Science
Blair A. Wormer, MD
Home Intravenous Versus Oral Antibiotics Following Appendectomy for Perforated Appendicitis, a Randomized Controlled Trial

Best Podium Presentation

2013
Basic Science
Eric D. Girard, MD
Amniotic Fluid Stem Cells in a Bioengineered Scaffold: a New Frontier in Patient Specific Therapy for Premature Lung Disease

Clinical Science
Ryan P. Cauley, MD
Higher Costs Charges and Resource Utilization do not Affect Survival in Congenital Diaphragmatic Hernia

2012
Amar Nijagal, MD
Fetal Intervention Triggers the Activation of Paternal Antigen-Specific Maternal T Cells

2011
Amar Nijagal, MD
The Maternal Adaptive Immune Response Against Paternal Antigens Incites Fetal Demise After Fetal Intervention

2010
Mehul V. Raval, MD
Pediatric ACS NSQIP: Feasibility of a Novel Prospective Assessment of Surgical Outcomes — a Phase I Report

2009
Eric Jelin, MD
Effects of Notch4 on Lung Vascular Remodeling

2008
Emily T. Durkin, MD
The Ontogeny of Human Fetal NK Cell Allorecognition: A Potential Barrier to *in Utero* Transplantation

Award Recipients (cont.)

Best Poster Presentation

2012
Eric J. Stanelle, MD
Pediatric Synovial Sarcoma: Prognostic Factors, Management of Pulmonary Metastasis, and Survival Outcomes

2011
Barrie S. Rich, MD
Predictors of Survival in Childhood and Adolescent Cutaneous Melanoma

2010
Allison L. Speer, MD
Tissue-Engineered Esophagus is a Versatile *in Vivo* Mouse Model with Intact Architecture

2009
Laura A. Boomer, MD
Cholangiocyte Apoptosis During Lamprey Metamorphosis

2008
Henry L. Chang, MD
In Vivo Metastatic/Invasion Assay to Identify Cancer Stem Cells and their Markers

APSA Posters of Distinction

Basic Science

2016
Julie Monteagudo, MD
Ex Vivo Comparison of Extracorporeal Membrane Oxygenation Circuits and Cannulae to Evaluate Sources of Hemolysis

2015
Elizabeth Clark, DVM
Characterization of Tissue Engineered Tracheal Grafts in an Ovine Model

2014
Catherine J. Hunter, MD
Defining the Role of Protein Kinase A and Apoptosis in Necrotizing Enterocolitis

2013
Leo Andrew O. Benedict, MD
Spinal Cord Expression of Virally Derived Mullerian Inhibiting Substance Extends Life and Promotes Survival of Motor Neurons in Transgenic SOD1 Mutant Mice

2012
Syamal D. Bhattacharya, MD
Temporal Relationships Between Positive Urine Culture and Onset of Necrotizing Enterocolitis

Award Recipients (cont.)

2011
R. Dawn Fevurly, MD
Novel Zebrafish Model Reveals Critical Role for MAPK in Lymphangiogenesis

2010
Hayden W. Stagg, MD
Matrix Metalloproteinase-9 Induces Hyperpermeability Following Traumatic Burn Injury

2009
Francois I. Luks, MD
Reflectance Spectrometry for Realtime Hemoglobin Determination of Placental Vessels During Endoscopic Laser Surgery for TTTS

Clinical Science

2016
Daniel L. Lodwick, MD, MS
Lymphocyte Depression and Postoperative Abscess after Appendectomy in Children

2015
Yinin Hu, MD
Cumulative Sum: an Individualized Proficiency Metric for Laparoscopic Fundamentals

2014
Cerine Jeanty, MD
Procedural Management of Cholelithiasis in Infants Under One Year of Age

2013
Deidre C. Kelleher, MD
Impact of a Checklist on ATLS Task Performance During Pediatric Trauma Resuscitation

2012
Alejandro Garcia, MD
The Role of Notch Inhibition in a Novel Hepatoblastoma Orthotopic Model

2011
Jesse R. Gutnick, MD
Circulating Thyrotropin Receptor MRNA for Evalution of Thyroid Nodules and Surveillance of Thyroid Cancer

2010
Diana L. Diesen, MD
Temporal Association Between Blood Transfusion and Necrotizing Enterocolitis in Premature Infants

2009
Henry L. Chang, MD
Mullerian Inhibiting Substance Inhibits Migration of Epithelial Cancer Cell Lines

Award Recipients (cont.)

Innovation Award

2016

Matthew A. Hornick, MD
Toward Physiologic Extracorporeal Support of the Premature Infant: Umbilical Cord Cannulation Provides Superior Oxygenator Flows, Oxygen Delivery and Hemodynamic Stability

Edward Hannon, MBChB, MRCS
Xenogeneic Decellularized Oesophageal Transplantation is Achievable in a Large Animal Model

2015

Maxime M. Mahe, PhD
Generation of Functional Intestine from Patient Derived Pluripotent Stem Cells

2014

Shahab Shaffiey, MD
Generation of an Artificial Intestine and Validation in Dogs: a Proof-of-Concept Study

2013

Veronica F. Sullins, MD
A Novel Biodegradable Device for Intestinal Lengthening

2012

Sabina Siddiqui, MD
Development of an Isolation Bed for Patients Undergoing MIBG Treatment for Neuroblastoma

2011

Maridelle B. Millendez, MD
Evaluation of Intestinal Viability Using 3-CCD (Charge Coupled Device) in Children Undergoing Appendectomy

Quality Award for Value in Surgery

Jamie R. Robinson, MD - 2016
Kathy Schall, MD - 2014
Jason W. Nielsen, MD - 2014

Travel Fellowship

The Travel Fellowship, supported by APSA and the APSA Foundation, is an annual award for young surgeons from a resource-poor area outside the United States and Canada to attend and experience the educational and networking opportunities of the APSA Annual Meeting. The winner attends and presents at the APSA Annual Meeting. The Travel Fellowship is supported by a generous grant from Sidra Medical and Research Center, Doha, Qatar.

2017

Martin Situma, MD
Mbarara University of Science & Technology, Mbarara, Uganda

Award Recipients (cont.)

Sushil Dhungel, MD
Western Regional Hospital, Pokhara Nepal

2016
Christian País, MD
Military Hospital-Ecuador
Quito, Ecuador
Pediatric Surgery, My "Axis of Action"

Esther Saguil, MD
College of Medicine, University of the Philippines
Manila, Philippines
The Practice of Pediatric Surgery in the Philippines

2015
Opeoluwa Adesanya, MBBS
Federal Medical Centre, Abeokuta
Ogun State, Nigeria
Pediatric Surgery in Nigeria — Defying the Odds

Tiyamike Chilunjika, MBBS
COSECSA, Queen Elizabeth Central Hospital
Blantyre, Malawi
Pediatric Surgery in Malawi

2014
John K.M. Nyagetuba, MB, ChB
Bethany Kids at Kijabe Hospital
Nairobi, Kenya
Paediatric Surgery in Kenya: Challenges and Solutions

Tran Anh Quynh, MD, PhD
National Hospital of Pediatrics
Hanoi, Vietnam
The Development of Vietnam Pediatric Surgery

2013
Omolara Williams, MD
Lagos State University College of Medicine and Lagos State University Teaching Hospital, Ikeja, Lagos, Nigeria
Practicing in a Resource Constrained Environment: Stumbling Blocks and Stepping Stones

New Members 2016 – 2017

The APSA Board of Governors and Membership Congratulates our Newest Members

May 2016 – March 2017

Regular Members
Baertschiger, Reto M.
Biller, C. Katrina
Chang, Henry L.
Chao, Stephanie D.
Chatoorgoon, Kaveer
Danko, Melissa
Dehmer, Jeffrey J.
Donoghue, Lydia J.
Duron, Vincent P.
Durrant, Audrey C.
Garza, Jennifer
Hamrick, Miller C.
Haricharan, Ramanathapura N.
Hartwich, Joseph E.
Jamshidi, Ramin
Jen, Howard Chung-Hao
Jensen, Aaron R.
Jones, Brian A.
Kassira, Noor
Kohler, Jonathan
Lautz, Timothy B.
Levene, Tamar L.
Lumpkins, Kimberly M.
Martin, Kathryn L.
Meisel, Jonathan A.
Nasr, Isam W.
Rauth, Thomas P.
Raval, Mehul V.
Rideout, Drew A.
Rocourt, Dorothy V.
Rymeski, Beth A.
Schlager, Avraham
Shekherdimian, Shant
Short, Joshua J.
Skinner, Sean C.
Speck, K. Elizabeth
Stafford, Shawn D.
Walton, Jonathan M.
Weil, Brent R.

Associate Members
Aranda, Arturo
Fernandez-Pineda, Israel
Menon, Meera N.

International Members
Kaseje, Neema
Singh, Shailinder J.

Candidate Members
Alshehri, Abdullah
Axt, Jason
Barthel, Erik R.
Bhalia, Varun K.
Brocks, Rebecca
Calisto, Juan L.
Fallon, Erica M.
Garcia, Alejandro
Grant, Christa N.
Gray, Fabienne L.
Honeyman, Joshua N.
Hu, Yue-Yung
Johnson, Jeremy J.
King, Alice
Kotagal, Meera
Lam, Jennifer
Lee, Constance
Lucas, Donald J. Jr.
Morris, Michael W. Jr.
Papic, Jonathan
Petroze, Robin T.
Russell, Katie W.
Ryan, Mark L.
Shah, Bhairav V.
Shue, Eveline
Snyder, Christopher W.
Staab, Victoriya

Resident Members
Abdulhai, Sophia
Ageel, Mohammed
Ahmad, Hira
Amin, Ruchi
Barry, Wesley E. III
Bartz-Kurycki, Marisa
Belyayev, Leonid
Chen, Y. Julia
Dukleska, Katerina
Emolo, Jared M.
Emr, Bryanna
Esparaz, Joseph
Golden, Jamie
Green, Jessica
Gulack, Brian
Gurien, Lori
Harrington, Amanda W.
Kabagambe, Sandra K.
Kashyap, Meghana
Koehler, Shannon
Kvasnovsky, Charlotte
McLaughlin, Cory
Pennell, Christopher P.
Richards, Morgan
Robinson, Jamie R.
Rosati, Shannon F.
Rossidis, Avery
Rosenfeld, Eric H.
Shahi, Niti
Sinclair, Tiffany
Tessler, Robert
Vana, Paul G.
Veras, Laura V.
Williams, Kibileri

New Members 2016-2017

Pledge for New Members of the American Pediatric Surgical Association

This pledge will be read before the New Member Induction Ceremony.

As president of the American Pediatric Surgical Association, it is my pleasure to welcome you into regular membership and to stress the obligations that you assume by such membership.

The American Pediatric Surgical Association was founded on April 15, 1970, by 200 surgeons drawn together to encourage specialization in the field of pediatric surgery; to make available the benefits to be derived from the services of qualified pediatric surgeons; to promote and maintain the quality of education in pediatric surgery through meetings, lectures and the distribution of printed materials; to raise the standards of the specialty by fostering and encouraging research and scientific progress in pediatric surgery and by establishing standards of excellence in the surgical care of infants, children and teenagers; and to provide a forum for the dissemination of information with regard to pediatric surgery.

The association expects its new members to support the objectives and obligations of the association as set forth in the Articles of Incorporation and to reflect the values expressed in the Principles of Medical Ethics as stated in the Preamble to the Bylaws. The members are also expected to support the association through active participation in its meetings. We look forward to your contributions in advancing its proud traditions.

If you pledge to exemplify the high ethical and professional standards of the American Pediatric Surgical Association in your practice of surgery, and if you will participate actively in future meetings, please respond by stating “I will.” Since you have indicated your intent to become an active and worthy member and since you have been duly elected, I now declare you to be a regular member of the American Pediatric Surgical Association.

I now call upon the current members and guests of the American Pediatric Surgical Association to rise and join me in welcoming our new colleagues.

In Memoriam (2016–2017)

Walter Cain, 2016
Eric W. Fonkalsrud, 2017
Jay L. Grosfeld, 2016
Michele Lynn Lombardo, 2017
Randall Wayne Powell, 2016
Donald P. Schaffner, 2016
Barry Shandling, 2016
Daniel H. Teitelbaum, 2016
Jessie L. Ternberg, 2016

Founding Members

Fred Arcari, Royal Oak, MI
E. Thomas Boles, Columbus, OH
John L. Cahill, Indian Wells, CA
John R. Campbell, Portland, OR
Alfred A. de Lorimier, Geyserville, CA
Frank G. DeLuca, Barrington, RI
Robert M. Filler, Toronto, ON, Canada
Eric W. Fonkalsrud, Santa Monica, CA
Edward A. Free, Prescott, AZ
Dale G. Johnson, Salt Lake City, UT
Peter K. Kottmeier, Rutledge, TN
Lucian L. Leape, Boston, MA
Julius Lister, Framingham, MA
John Raffensperger, Sanibel, FL
Mark I. Rowe, Sanibel, FL
William K. Sieber, Yerona, PA
Robert T. Soper, Iowa City, IA
James A. Talbert, Gainesville, FL
Edward S. Tank, Portland, OR

Charter Members

Raymond A. Amoury, Kansas City, MO
H. Paulsen Armstrong, Baton Rouge, LA
A. Robert Beck, New York, NY
Jerrold M. Becker, New Hyde Park, NY
Clifford R. Boeckman, Salem, SC
Scott J. Boley, Bronx, NY
William E. Bomar, Gray Court, SC
John D. Burrington, Colorado Springs, CO
John L. Cahill, Indian Wells, CA
Walter S. Cain, Birmingham, AL
Gordon S. Cameron, Dunas, ON, Canada
Daniel T. Cloud, Phoenix, AZ
David L. Collins, San Diego, CA
Elizabeth Coryllos, Mineola, NY
C. Peter Crowe, Tucson, AZ
Joseph S. David, Eagle, ID
Jean G. DesJardins, Saint-Laurent, QC, Canada
Pieter A. deVries, Larkspur, CA
George W. Dorman, Prescott, AZ
Jacques C. Ducharme, Mont Royal, QC, Canada
Dick G. Ellis, Fort Worth, TX
John H. Fisher, Marshfield, MA
Eric W. Fonkalsrud, Santa Monica, CA
Eugene Garrow, Jersey City, NJ
Marvin Glicklich, Fox Point, WI
Leonard Graivier, Dallas, TX
Jacob A. Haller, Glencoe, MD
Daniel M. Hays, Riverside, CA
Bruce M. Henderson, Corpus Christi, TX
W. Hardy Hendren, Duxbury, MA
Jack H. Hertzler, Franklin, MI
George W. Holcomb, Nashville, TX
Thomas M. Holder, Prairie Village, KS
James W. Hopkins, Windsor Heights, IA
George A. Hyde, Horare, Avondale, Zimbabwe
Patrick F. Jewell, Lincoln, CA
Frank R. Johnson, Frankfort, MI
Kenneth Kenigsberg, Glen Cove, NY
William N. Kincannon, Santa Barbara, CA
Murray R. Kliman, Vancouver, BC, Canada
Charles H. Klippel, Paxton, MA
Irwin H. Krasna, Forest Hills, NY
Dennis J. Lafer, Jacksonville, FL
J. Eugene Lewis, St. Louis, MO
Peter S. Liebert, White Plains, NY
Hugh B. Lynn, Winchester, VA
Enrique Marquez, San Juan, PR

Charter Members (cont.)

Lester W. Martin, Bellbrook, OH
R. W. Paul Mellish, Dhahran, Saudi Arabia
Ascher L. Mestel, Brooklyn, NY
Richard C. Miller, Jackson, MS
David R. Murphy, Kingston, ON, Canada
James A. O'Neill, Jr., Nashville, TN
H. Biemann Othersen, Charleston, SC
Cedric J. Priebe, Stony Brook, NY
Thomas C. Putnam, Rockland, ME
Judson Randolph, Nashville, TN
Lester R. Sauvage, Seattle, WA
Louise Schnaufer, Philadelphia, PA
John N. Schullinger, Woodstock, VT
Lloyd Schultz, Omaha, NE
Samuel R. Schuster, Westboro, MA
Alan D. Shafer, Dayton, OH
Barry Shandling, Toronto, ON, Canada
Anthony Shaw, Pasadena, CA
Walton K.T. Shim, Honolulu, HI
Laurence A. Somers, Lafayette Hill, PA
Bernard J. Spencer, Sanibel Island, FL
Rowena Spencer, New Orleans, LA
Nicholas M. Stahl, Charlestown, RI
Felicien M. Steichen, Mamaroneck, NY
H. Harlan Stone, Glenville, NC
Kamthorn Sukarochana, Pittsburgh, PA
Orvar Swenson, Charleston, SC
Jessie L. Ternberg, St. Louis, MO
Robert J. Touloukian, New Haven, CT
David S. Trump, Grants Pass, OR
Kenneth R. Tyson, Burnet, TX
Arie D. Verhagen, Hamilton, OH
Vollrad J. Von Berg, Hot Springs, AR
Theodore P. Votteler, Dallas, TX
H. Warner Webb, Jacksonville, FL
John J. White, Seattle, WA
Albert H. Wilkinson, Jacksonville, FL
Morton M. Woolley, Rancho Mirage, CA
Earle L. Wrenn, Greensboro, NC

Schedule & Program

Schedule-at-a-Glance

Wednesday, May 3

7:00 a.m. – 2:00 p.m.	APSA Board of Governors Meeting	
2:30 p.m. – 6:00 p.m.	Association of Pediatric Surgery Training Program Directors Meeting	*Great Hall 5, 3rd Fl.*
3:00 p.m. – 7:00 p.m.	Registration Open	*Great Hall 4 Foyer, 3rd Fl.*
3:00 p.m. – 7:00 p.m.	Speaker Ready Room Open	*Great Hall Registration Desk, 3rd Fl.*
3:00 p.m. – 7:00 p.m.	Internet Café Open/Twitter Fall	*Great Hall 4 Foyer, 3rd Fl.*
6:30 p.m. – 10:00 p.m.	Publications Committee Meeting	*Room 308, N, 3rd Fl.*

Thursday, May 4 – EDUCATION DAY

6:00 a.m. – 8:00 a.m.	**Committee Meetings** (see page 61 for Ancillary Meeting Schedule)	
6:30 a.m. – 7:30 a.m.	Continental Breakfast	*Great Hall 4 Foyer, 3rd Fl.*
6:30 a.m. – 2:00 p.m.	Poster Presenter Set-up	*Great Hall 3, 3rd Fl.*
6:30 a.m. – 5:00 p.m.	Registration Open	*Great Hall 4 Foyer, 3rd Fl.*
6:30 a.m. – 5:00 p.m.	Speaker Ready Room Open	*Great Hall Registration Desk, 3rd Fl.*
6:30 a.m. – 5:00 p.m.	Internet Café Open/Twitter Fall	*Great Hall 4 Foyer, 3rd Fl.*
7:45 a.m. – 8:00 a.m.	President's Welcome	*Great Hall 4, 3rd Fl.*
8:00 a.m. – 10:00 a.m.	Companion Hospitality Suite Open	*33rd Floor Lounge*
8:00 a.m. – 11:00 a.m.	**Education Session I:** Education Committee Surgeons as Educators and Leaders	*Great Hall 4, 3rd Fl.*
9:00 a.m. – 2:00 p.m.	Exhibitor Set-up	*Great Hall 3, 3rd Fl.*
11:00 a.m. – Noon	**Outcomes and Evidence-based Practice Committee Systematic Reviews**	*Great Hall 4, 3rd Fl.*
Noon – 12:15 p.m.	Health Policy Update	*Great Hall 4, 3rd Fl.*
12:15 p.m. – 12:45 p.m.	Box Lunch Pick-up	*Great Hall Foyer, 3rd Fl.*
12:45 p.m. – 2:15 p.m.	**Case Debates and Controversies**	*Great Hall 4, 3rd Fl.*
2:15 p.m. – 4:15 p.m.	**Concurrent Education Sessions II & III**	
	Education Session II: Parent and Family Education Joint Session with APSNA	*Great Hall 4, 3rd Fl.*
	Education Session III: Surgical Critical Care Committee Update	*Great Hall 1, 3rd Fl.*
3:00 p.m. – 5:30 p.m.	Exhibit Hall Open	*Great Hall 3, 3rd Fl.*
3:00 p.m. – 5:30 p.m.	Poster Hall Open	*Great Hall 3, 3rd Fl.*
4:15 p.m. – 5:15 p.m.	Wine and Cheese Reception in the Exhibit Hall	*Great Hall 3, 3rd Fl.*
4:30 p.m. – 6:15 p.m.	**Concurrent Oral Poster Presentations**	
	Oral Poster Presentations I: Basic Science	*Great Hall 1, 3rd Fl.*
	Oral Poster Presentations II: Clinical Surgery	*Great Hall 4, 3rd Fl.*
7:00 p.m. – 9:00 p.m.	Welcome Reception	*Lagoon Pool Deck, Lobby Level*

Schedule-at-a-Glance (cont.)

Friday, May 5

6:00 a.m. – 7:30 a.m.	**Committee Meetings** (see page 61 for Ancillary Meeting Schedule)	
6:00 a.m. – 7:30 a.m.	APSA Foundation Board Meeting	*Room 320, S, 3rd Fl.*
6:30 a.m. – 7:30 a.m.	Continental Breakfast	*Great Hall 3, 3rd Fl.*
6:30 a.m. – 1:00 p.m.	Simulation Learning Center *(walk-up station, no registration required)*	*Great Hall 3, 3rd Fl.*
6:30 a.m. – 1:00 p.m.	Exhibit Hall Open	*Great Hall 3, 3rd Fl.*
6:30 a.m. – 1:00 p.m.	Poster Hall Open	*Great Hall 3, 3rd Fl.*
6:30 a.m. – 1:30 p.m.	Registration Open	*Great Hall 4 Foyer, 3rd Fl.*
6:30 a.m. – 1:30 p.m.	Speaker Ready Room Open	*Great Hall Registration Desk, 3rd Fl.*
6:30 a.m. – 1:30 p.m.	Internet Café Open/Twitter Fall	*Great Hall 4 Foyer, 3rd Fl.*
7:15 a.m. – 8:45 a.m.	Simulation Course: Thoracoscopic Lobectomy *(registration required, CME available)*	*Great Hall 2, 3rd Fl.*
7:30 a.m. – 9:00 a.m.	**Plenary Session I**	*Great Hall 4, 3rd Fl.*
8:00 a.m. – 10:00 a.m.	Companion Hospitality Suite Open	*33rd Floor Lounge*
9:00 a.m. – 10:00 a.m.	***Journal of Pediatric Surgery* Lecture/** **Presidential Address** Presented by Diana L. Farmer, MD, APSA President *UC Davis Children's Hospital UC Davis Health*	*Great Hall 4, 3rd Fl.*
10:00 a.m. – 10:30 a.m.	Refreshment Break	*Great Hall 3, 3rd Fl.*
10:30 a.m. – Noon	**Concurrent Scientific Sessions I & II**	
	Scientific Session I: Enterocolitis, Sepsis, Basic Science	*Great Hall 4, 3rd Fl.*
	Scientific Session II: Appendicitis, General Pediatric Surgery	*Great Hall 1, 3rd Fl.*
Noon – 12:15 p.m.	Refreshment Break	*Great Hall 4 Foyer, 3rd Fl.*
12:15 p.m. – 1:30 p.m.	**Concurrent Scientific Sessions III & IV**	
	Scientific Session III: Trauma, Reproductive, GI	*Great Hall 4, 3rd Fl.*
	Scientific Session IV: CDH/ECMO, Neonatal Surgery, Thoracic	*Great Hall 1, 3rd Fl.*
1:00 p.m. – 2:30 p.m.	Simulation Course: Thoracoscopic TEF Repair *(registration required; CME available)*	*Great Hall 2, 3rd Fl.*
1:30 p.m.	Leisure Time	
1:30 p.m. – 3:30 p.m.	Benjy Brooks Luncheon *(pre-registration required)*	*Room 307, N, 3rd Fl.*
4:30 p.m. – 5:30 p.m.	Residents Reception	*Room 320, S, 3rd Fl.*
5:00 p.m. – 6:30 p.m.	*Journal of Pediatric Surgery* Reception *(by invitation)*	*Room 307, N, 3rd Fl.*
6:30 p.m. – 7:00 p.m.	New Member Rehearsal *(by invitation)*	*Great Hall 4, 3rd Fl.*

Schedule-at-a-Glance (cont.)

Saturday, May 6

6:00 a.m. – 4:00 p.m.	Registration Open	*Great Hall 4 Foyer, 3rd Fl.*
6:00 a.m. – 4:00 p.m.	Speaker Ready Room Open	*Great Hall Registration Desk, 3rd Fl.*
6:00 a.m. – 4:00 p.m.	Internet Café Open/Twitter Fall	*Great Hall 4 Foyer, 3rd Fl.*
6:30 a.m. – 8:00 a.m.	Continental Breakfast	*Great Hall 3, 3rd Fl.*
6:30 a.m. – 10:00 a.m.	Simulation Learning Center *(walk-up station, no registration required)*	*Great Hall 3, 3rd Fl.*
6:30 a.m. – 10:00 a.m.	Poster Hall Open	*Great Hall 3, 3rd Fl.*
6:30 a.m. – 10:00 a.m.	Exhibit Hall Open	*Great Hall 3, 3rd Fl.*
7:00 a.m. – 8:00 a.m.	Business Meeting – all are welcome	*Great Hall 4, 3rd Fl.*
7:30 a.m. – 9:00 a.m.	Simulation Course: Thoracoscopic Lobectomy *(registration required, CME available)*	*Great Hall 2, 3rd Fl.*
8:00 a.m. – 9:00 a.m.	**Innovation Session**	*Great Hall 4, 3rd Fl.*
8:00 a.m. – 10:00 a.m.	Companion Hospitality Suite Open	*3rd Floor Lounge*
9:00 a.m. – 9:45 a.m.	Refreshment Break	*Great Hall 3, 3rd Fl.*
9:45 a.m. – 10:30 a.m.	**Robert E. Gross Lecture** presented by Stephen W. Bickler, MD, DTM&H *Rady Children's Hospital – University of California*	*Great Hall 4, 3rd Fl.*
10:00 a.m.	Exhibitor Dismantle	*Great Hall 3, 3rd Fl.*
10:00 a.m.	Simulation Learning Center Dismantle	*Great Hall 3, 3rd Fl.*
10:00 a.m.	Poster Presenter Dismantle	*Great Hall 3, 3rd Fl.*
10:30 a.m. – 11:30 a.m.	**Plenary Session II**	*Great Hall 4, 3rd Fl.*
11:30 a.m. – 12:15 p.m.	**Jay and Margie Grosfeld Lecture** presented by James A. O'Neill, Jr., MD *Vanderbilt University School of Medicine and Medical Center*	*Great Hall 4, 3rd Fl.*
12:15 p.m. – 1:00 p.m.	Box Lunch Pick-up	Great Hall 4 Foyer, *3rd Fl.*
1:00 p.m. – 1:30 p.m.	Travel Fellow Presentation Martin Situma, MD, *Mbarara University of Science & Technology, Mbarara, Uganda* Sushil Dhungel, MD, *Western Regional Hospital, Pokhara, Nepal*	*Great Hall 4, 3rd Fl.*
1:30 p.m. – 1:45 p.m.	New Member Induction Ceremony	*Great Hall 4, 3rd Fl.*
2:00 p.m. – 3:00 p.m.	**Scientific Session V: Oncology**	*Great Hall 4, 3rd Fl.*
3:00 p.m. – 4:00 p.m.	**Video Session**	*Great Hall 4, 3rd Fl.*
4:00 p.m. – 6:00 p.m.	Pediatric Surgery NaT Reception *(by invitation)*	*Room 307, N, 3rd Fl.*
6:30 p.m. – 7:00 p.m.	President's Reception	*South Palm Court, Lobby Level*
7:00 p.m. – 10:00 p.m.	President's Banquet	*Great Hall 4, 3rd Fl.*

Schedule-at-a-Glance (cont.)

Sunday, May 7

6:00 a.m. – 8:00 a.m.	Committee Meetings (see page 61 for Ancillary Meeting Schedule)	
6:30 a.m. – 8:00 a.m.	Continental Breakfast	*Great Hall Foyer, 3rd Fl.*
7:30 a.m. – 11:00 a.m.	Registration Open	*Great Hall 4 Foyer, 3rd Fl.*
7:30 a.m. – 11:00 a.m.	Speaker Ready Room Open	*Great Hall Registration Desk, 3rd Fl.*
7:30 a.m. – 11:00 a.m.	Internet Café Open/Twitter Fall	*Great Hall 4 Foyer, 3rd Fl.*
8:00 a.m. – 9:00 a.m.	**COG Update**	*Great Hall 4, 3rd Fl.*
9:00 a.m. – 11:00 a.m.	Town Hall Meeting	*Great Hall 4, 3rd Fl.*
11:00 a.m.	Meeting Concludes	

Ancillary Meeting by Group

NOTE: All committee meetings take place on the third floor of the South and North Towers of the hotel, which is different from the third floor where general sessions take place.

Committee	Date/Time	Room
AAP Delivery of Surgical Care Committee	Saturday, May 6, 7:00 a.m. - 8:00 a.m.	311, S, 3rd Fl.
AAP Publications Committee	Saturday, May 6, 6:30 a.m. - 7:30 a.m.	319, S, 3rd Fl.
AAP SoSu EC & Strategic Planning	Sunday, May 7, 1:00 p.m. - 6:00 p.m.	320, S, 3rd Fl.
ACS Pediatric Surgery Advisory Council	Friday, May 5, 3:30 p.m. - 5:30 p.m.	317, S, 3rd Fl.
Anniversary Celebration Committee	Thursday, May 4, 6:00 a.m. - 7:00 a.m.	316, S, 3rd Fl.
APSA Foundation Board Meeting	Friday, May 5, 6:00 a.m. - 7:30 a.m.	320, S, 3rd Fl.
APSTPD - Program Directors	Wednesday, May 3, 2:30 p.m. - 6:00 p.m.	Great Hall 5, 3rd Fl.
Audit Committee	Thursday, May 4, 6:00 a.m. - 7:00 a.m.	321, S, 3rd Fl.
Baylor (BCM) Reunion	Friday, May 5, 5:30 p.m. - 7:00 p.m.	319, S, 3rd Fl.
Benjy Brooks Luncheon	Friday, May 5, 1:30 p.m. - 3:30 p.m.	307, N, 3rd Fl.
Board of Governors	Wednesday, May 3, 7:00 a.m. - 2:00 p.m.	314, S, 3rd Fl.
Bylaws Committee	Friday, May 5, 6:00 a.m. - 7:30 a.m.	305, N, 3rd Fl.
Cancer Committee	Friday, May 5, 6:00 a.m. - 7:30 a.m.	311, S, 3rd Fl.
Childhood Obesity Committee	Thursday, May 4, 7:00 a.m. - 8:00 a.m.	321, S, 3rd Fl.
COG Research Collaborative Group	Sunday, May 7, 6:30 a.m. - 8:00 a.m.	320, S, 3rd Fl.
Education Committee	Wednesday, May 3, 6:30 p.m. - 7:30 p.m.	305, N, 3rd Fl.
Ethics Committee	Wednesday, May 3, 6:00 p.m. - 7:00 p.m.	311, S, 3rd Fl.
Fetal Diagnosis & Treatment Committee	Thursday, May 4, 6:00 a.m. - 7:30 a.m.	308, N, 3rd Fl.
Florida Association of Pediatric Surgeons	Saturday, May 6, 12:15 p.m. - 1:00 p.m.	317, S, 3rd Fl.
Global Pediatric Surgery Committee	Friday, May 5, 6:00 a.m. - 7:30 a.m.	319, S, 3rd Fl.
Health Policy and Advocacy Committee	Friday, May 5, 3:30 p.m. - 5:00 p.m.	316, S, 3rd Fl.
Hirschsprung Disease Interest Group	Friday, May 5, 6:00 a.m. - 7:00 a.m.	308, N, 3rd Fl.

Ancillary Meeting by Group (cont.)

NOTE: All committee meetings take place on the third floor of the South and North Towers of the hotel, which is different from the third floor where general sessions take place.

Committee	Date/Time	Room
Industry Advisory Committee	Friday, May 5, 6:00 a.m. - 7:30 a.m.	310, S, 3rd Fl.
Informatics and Telemedicine Committee	Friday, May 5, 6:00 a.m. - 7:30 a.m.	322, N, 3rd Fl.
JPS Reception *(by invitation)*	Friday, May 5, 5:00 p.m. - 6:30 p.m.	307, N, 3rd Fl.
Membership & Credentials Committee	Friday, May 5, 6:30 a.m. - 7:30 a.m.	316, S, 3rd Fl.
Pediatric Surgery NaT Reception	Saturday, May 6, 4:00 p.m. - 6:00 p.m.	307, N, 3rd Fl.
New Technology Committee	Thursday, May 4, 7:00 a.m. - 8:00 a.m.	311, S, 3rd Fl.
Outcomes and Evidence-based Practice Committee	Thursday, May 4, 6:00 a.m. - 7:00 a.m.	320, S, 3rd Fl.
Pediatric Surgery Research Collaborative (PedSRC)	Friday, May 5, 6:30 a.m. - 7:30 a.m.	307, N, 3rd Fl.
Practice Committee	Thursday, May 4, 6:00 a.m. - 7:00 a.m.	311, S, 3rd Fl.
Program Committee	Wednesday, May 3, 6:30 p.m. - 7:30 p.m.	314, S, 3rd Fl.
Publications Committee	Wednesday, May 3, 6:30 p.m. - 10:00 p.m.	308, N, 3rd Fl.
Research Committee	Thursday, May 4, 6:00 a.m. - 7:30 a.m.	319, S, 3rd Fl.
Residents Reception	Friday, May 5, 4:30 p.m. - 5:30 p.m.	320, S, 3rd Fl.
Surgical Critical Care Committee	Friday, May 5, 6:00 a.m. - 7:30 a.m.	317, S, 3rd Fl.
Surgical Quality & Safety Committee	Thursday, May 4, 7:00 a.m. - 8:00 a.m.	305, N, 3rd Fl.
Trauma Committee	Thursday, May 4, 6:30 a.m. - 8:00 a.m.	317, S, 3rd Fl.
Workforce Committee	Friday, May 5, 6:00 a.m. - 7:30 a.m.	301, N, 3rd Fl.

Ancillary Meeting by Day

NOTE: All committee meetings take place on the third floor of the South and North Towers of the hotel, which is different from the third floor where general sessions take place.

Committee	Date/Time	Room
Wednesday, May 3		
Board of Governors	Wednesday, May 3, 7:00 a.m. - 2:00 p.m.	314, S, 3rd Fl.
APSTPD - Program Directors	Wednesday, May 3, 2:30 p.m. - 6:00 p.m.	Great Hall 5, 3rd Fl.
Ethics Committee	Wednesday, May 3, 6:00 p.m. - 7:00 p.m.	311, S, 3rd Fl.
Education Committee	Wednesday, May 3, 6:30 p.m. - 7:30 p.m.	305, N, 3rd Fl.
Program Committee	Wednesday, May 3, 6:30 p.m. - 7:30 p.m.	314, S, 3rd Fl.
Publications Committee	Wednesday, May 3, 6:30 p.m. - 10:00 p.m.	308, N, 3rd Fl.
Thursday, May 4		
Anniversary Celebration Committee	Thursday, May 4, 6:00 a.m. - 7:00 a.m.	316, S, 3rd Fl.
Audit Committee	Thursday, May 4, 6:00 a.m. - 7:00 a.m.	321, S, 3rd Fl.
Outcomes and Evidence-based Practice Committee	Thursday, May 4, 6:00 a.m. - 7:00 a.m.	320, S, 3rd Fl.
Practice Committee	Thursday, May 4, 6:00 a.m. - 7:00 a.m.	311, S, 3rd Fl.
Fetal Diagnosis & Treatment Committee	Thursday, May 4, 6:00 a.m. - 7:30 a.m.	308, N, 3rd Fl.
Research Committee	Thursday, May 4, 6:00 a.m. - 7:30 a.m.	319, S, 3rd Fl.
Trauma Committee	Thursday, May 4, 6:30 a.m. - 8:00 a.m.	317, S, 3rd Fl.
Childhood Obesity Committee	Thursday, May 4, 7:00 a.m. - 8:00 a.m.	321, S, 3rd Fl.
New Technology Committee	Thursday, May 4, 7:00 a.m. - 8:00 a.m.	311, S, 3rd Fl.
Surgical Quality & Safety Committee	Thursday, May 4, 7:00 a.m. - 8:00 a.m.	305, N, 3rd Fl.

Ancillary Meeting by Day (cont.)

NOTE: All committee meetings take place on the third floor of the South and North Towers of the hotel, which is different from the third floor where general sessions take place.

Committee	Date/Time	Room
Friday, May 5		
Hirschsprung Disease Interest Group	Friday, May 5, 6:00 a.m. - 7:00 a.m.	308, N, 3rd Fl.
Bylaws Committee	Friday, May 5, 6:00 a.m. - 7:30 a.m.	305, N, 3rd Fl.
Cancer Committee	Friday, May 5, 6:00 a.m. - 7:30 a.m.	311, S, 3rd Fl.
Global Pediatric Surgery Committee	Friday, May 5, 6:00 a.m. - 7:30 a.m.	319, S, 3rd Fl.
Industry Advisory Committee	Friday, May 5, 6:00 a.m. - 7:30 a.m.	310, S, 3rd Fl.
Informatics and Telemedicine Committee	Friday, May 5, 6:00 a.m. - 7:30 a.m.	322, N, 3rd Fl.
Surgical Critical Care Committee	Friday, May 5, 6:00 a.m. - 7:30 a.m.	317, S, 3rd Fl.
APSA Foundation Board Meeting	Friday, May 5, 6:00 a.m. - 7:30 a.m.	320, S, 3rd Fl.
Workforce Committee	Friday, May 5, 6:00 a.m. - 7:30 a.m.	301, N, 3rd Fl.
Membership & Credentials Committee	Friday, May 5, 6:30 a.m. - 7:30 a.m.	316, S, 3rd Fl.
Pediatric Surgery Research Collaborative (PedSRC)	Friday, May 5, 6:30 a.m. - 7:30 a.m.	307, N, 3rd Fl.
ACS Pediatric Surgery Advisory Council	Friday, May 5, 3:30 p.m. - 5:30 p.m.	317, S, 3rd Fl.
Benjy Brooks Luncheon	Friday, May 5, 1:30 p.m. - 3:30 p.m.	307, N, 3rd Fl.
Health Policy and Advocacy Committee	Friday, May 5, 3:30 p.m. - 5:00 p.m.	316, S, 3rd Fl.
Residents Reception	Friday, May 5, 4:30 p.m. - 5:30 p.m.	320, S, 3rd Fl.
JPS Reception *(by invitation)*	Friday, May 5, 5:00 p.m. - 6:30 p.m.	307, N, 3rd Fl.
Baylor (BCM) Reunion	Friday, May 5, 5:30 p.m. - 7:00 p.m.	319, S, 3rd Fl.

Ancillary Meeting by Day (cont.)

NOTE: All committee meetings take place on the third floor of the South and North Towers of the hotel, which is different from the third floor where general sessions take place.

Committee	Date/Time	Room
Saturday, May 6		
AAP Publications Committee	Saturday, May 6, 6:30 a.m. - 7:30 a.m.	319, S, 3rd Fl.
AAP Delivery of Surgical Care Committee	Saturday, May 6, 7:00 a.m. - 8:00 a.m.	311, S, 3rd Fl.
Florida Association of Pediatric Surgeons	Saturday, May 6, 12:15 p.m. - 1:00 p.m.	317, S, 3rd Fl.
Pediatric Surgery NaT Reception	Saturday, May 6, 4:00 p.m. - 6:00 p.m.	307, N, 3rd Fl.
Sunday, May 7		
COG Research Collaborative Group	Sunday, May 7, 6:30 a.m. - 8:00 a.m.	320, S, 3rd Fl.
AAP SoSu EC & Strategic Planning	Sunday, May 7, 1:00 p.m. - 6:00 p.m.	320, S, 3rd Fl.

Education Overview

The APSA Annual Meeting is designed to provide comprehensive continuing education in the field of pediatric surgery. APSA strives to bring together the world's leading pediatric surgery authorities to present and discuss the most recent clinical and research efforts.

The APSA Annual Meeting covers the breadth of pediatric surgery and is intended to acquaint attendees with the latest research findings, updates on evidence-based care guidelines, innovations in quality improvement and clinical discoveries and trends that influence the day-to-day practice of pediatric surgery. Specific sessions relating to educating members on new developments in medical technology have been added to supplement the traditional sessions on clinical practice and basic science research chosen by the Program and Education Committees. The scientific sessions consist of basic research and practical clinical presentations. The poster sessions are intended to provide young investigators an opportunity to share preliminary clinical research, basic science work and novel ideas.

Accreditation Statement

The American Pediatric Surgical Association is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education (CME) for physicians. This live CME activity has been planned and implemented in accordance with the Essential Areas and Policies of the Accreditation Council for Continuing Medical Education (ACCME).

APSA 2017 Annual Meeting

APSA designates this live activity for a maximum of 21 *AMA PRA Category 1 Credits*™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

The American Pediatric Surgical Association education credentials have been recognized and upgraded by the Accreditation Council for Continuing Medical Education from Accreditation to Accreditation with Commendation. The ACCME is the national accrediting board for all medical education organizations in the U.S. that administer courses and confer Continuing Medical Education credits to physicians and health care providers.

Disclosures

Disclaimer: These materials and all other materials provided in conjunction with CME activities are intended solely for purposes of supplementing CME programs for qualified health care professionals. Anyone using the materials assumes full responsibility and all risk for their appropriate use. APSA makes no warranties or representations whatsoever regarding the accuracy, completeness, currentness, noninfringement, merchantability or fitness for a particular purpose of the materials. In no event will APSA be liable to anyone for any decision made or action taken in reliance on the materials. In no event should the information in the materials be used as a substitute for professional care.

Policy on Faculty Disclosure

It is the policy of the ACCME and APSA that the planning committee and faculty disclose and resolve real or apparent conflicts of interest relating to the content of the educational activity, and also disclose discussions of unlabeled/unapproved uses of drugs or devices during their presentations.

Faculty Disclosures

In the case of faculty presentations the following faculty members have disclosed a financial relationship with an industry partner. The relationship was proven not to have an impact on the science presented at this annual meeting. All other faculty indicated that they have no financial relationships to disclose.

Christopher K. Breuer
Consulting: Advisory Board of Cook Biomedical

Christine M. Finck
Grant/Research Support: Biostage
Intellectual Property: Biostage

Michael R. Harrison
Founder, MagNap, Inc.

Gretchen Jackson
Grant/Research Support: AHRQ; Vanderbilt Center for Effective Health Community

Todd Jensen
Grant/Research Support: Biostage
Intellectual Property: Biostage

Jed Johnson
Intellectual Property: Cofounder of Nanofibers Solutions
Stockholder/Ownership: Cofounder and co-owner of Nanofibers Solutions

Robert E. Kelly, Jr.
Consulting: Zimmer Biomet Microfixation, LLC

Marc A. Levitt
Consulting: Merck
Stockholder/Ownership: Justright Surgical

Troy A. Markel
Grant/Research Support: Indiana University Health Values Fund for Research Award, Showalter Young Investigator Award, Indiana Clinical and Translational Sciences Institute KL2 Program

John Martinie
Proctor and Instructor for Intuitive Surgical

Robert J. Obermeyer
Consulting: Zimmer Biomet Microfixation, LLC

Todd A. Ponsky
Consultant: CONMED
Ownership interest: GlobalCastMD

Mark Rittenberg
Consultant: Children's Hospital of Oakland

Steven Rothenberg
Stockholder/Ownership: JustRight Surgical

Disclosures (cont.)

Committee Disclosures

Disclosures were collected from all committee members with influence over the educational content of the annual meeting program. These committee members have reported the following financial relationships and it has been determined that no conflict of interest exists with any of these relationships. All other committee members indicated that they have no financial relationships to disclose.

Daniel Ostlie – Program Committee
Ownership/Interest: JustRight Surgical - Part Owner

Journal of Pediatric Surgery Lecture/ Presidential Address

Friday, May 5, 2017 | 9:00 - 10:00 a.m.

Diana L. Farmer, MD
Professor and Chair, Department of Surgery, Surgeon-in-Chief, UC Davis Children's Hospital, UC Davis Health, Sacramento, CA USA

Audacious Goals 2.0: The Global Initiative in Children's Surgery

Dr. Diana L. Farmer holds the Pearl Stamps Stewart Endowed Chair, is Professor and Chair of the Department of Surgery and the University of California, Davis Health System, and is the Surgeon-in-Chief of the University of California, Davis Children's Hospital. After graduating from Wellesley College, she spent four years studying marine biology in Bermuda, at Stanford and at MIT/Woods Hole. She then received her MD degree from the University of Washington School of Medicine and remained there for two years of her general surgery residency. After a two-year post-doctoral fellowship in surgical oncology at University of California, San Francisco, she stayed there to complete her general surgery training. She obtained her pediatric surgery training at the Children's Hospital of Michigan in Detroit, remained as faculty for three years, and then returned to UCSF as an Associate Professor of Surgery. She was promoted to Professor of Surgery at UCSF four years later, was promoted to the Division Chief of Pediatric Surgery the following year, and subsequently assumed the role as Surgeon-in-Chief and Vice-Chair of the Department of Surgery. She was hired as the Chair of the Department of Surgery at UC Davis in 2011.

Farmer has been honored with numerous awards throughout her career including being a LUCE Scholar, a member of the Royal College of Surgeons of England and a member of the esteemed National Academy of Sciences Institute of Medicine. She is the President of the American Pediatric Surgical Association. Farmer's laboratory made the seminal discovery that hindbrain herniation could be ameliorated by prenatal repair in fetal sheep model. She is most well known for her role as a Principal Investigator on the $22 million NIH funded Management of Myelomeningocele Study (MOMS Trial), the results of which were published in the *New England Journal of Medicine.* Farmer has published 125 manuscripts and 23 book chapters, has delivered 118 invited lectures as well as 57 international and national presentations, and has mentored more than 30 MD and PhD students in her lab.

Robert E. Gross Lecture

Saturday, May 6, 2017 | 9:45 - 10:30 a.m.

Stephen W. Bickler, MD, DTM&H
Professor of Surgery and Pediatrics,
Rady Children's Hospital - University of California,
San Diego CA USA

Out of Africa: Insights from a Prospective Pediatric Surgery Database

Prior to joining the University of California, San Diego, Dr. Stephen W. Bickler was the Consultant Pediatric Surgeon at the Royal Victoria Hospital in Banjul, The Gambia (West Africa). During this time he was the recipient of a Denis Burkitt fellowship to study the epidemiology of pediatric surgical diseases in sub-Saharan Africa. He has served as a consultant for the World Health Organization on surgery in low-income countries and has published extensively on strategies for improving the surgical care in settings of limited resources. Bickler has edited two pediatric surgery textbooks for sub-Saharan Africa, and was a Co-Principle investigator on a six-year NIH funded project to improve surgical care in rural areas of Mozambique. He was a contributing author to the 3rd Edition of Disease Control Priorities (World Bank) and a co-author on the Lancet Commission on Global Surgery. His research interests include surgical epidemiology, financing of surgical care in settings of limited resources, and the origins of non-communicable diseases. Bickler received his medical degree from UC Irvine, College of Medicine and a Diploma of Tropical Medicine & Hygiene from the University of London. He completed his surgical residency at Oregon Health & Science University and his pediatric surgery fellowship at Children's Mercy in Kansas City, Missouri, USA.

Jay and Margie Grosfeld Lecture

Saturday, May 6, 2017 | 11:30 a.m. – 12:15 p.m.

James A. O'Neill, Jr., MD
JC Foshee Distinguished Professor and Chairman Emeritus, Section of Surgical Sciences, Vanderbilt University School of Medicine and Medical Center, Nashville, TN USA

A Model for Humanitarian Outreach in Today's World

Dr. James A. O'Neill, Jr., attended Georgetown and Yale Medical School, followed by residencies in general, cardiothoracic and pediatric surgery. Then, during the Viet Nam War, he was Chief of the Burn Study Division of the U.S. Army Surgical Research Unit in San Antonio, completing numerous studies related to pathophysiology and fluid resuscitation in adults and children with burn injury. He has since led pediatric surgery at LSU, Vanderbilt and Children's Hospital of Philadelphia/University of Pennsylvania as the CE Koop Professor and Surgeon-in-Chief (1981-95). Since then, he has been the JC Foshee Distinguished Professor and Chairman of the Section of Surgical Sciences at Vanderbilt, now emeritus. He currently sees patients, teaches and does research, much now related to global initiatives.

O'Neill is a member of 33 professional societies with numerous leadership positions including APSA President (1988-1989), Chairman of the Section on Surgery of the American Academy of Pediatrics; President of the Southern Surgical Association and several other surgical organizations; a Director of the American Board of Surgery; a Governor of the American College of Surgeons and a member of its Committee on Trauma. He serves on numerous editorial boards and has more than 330 publications including the 2 Vol. Pediatric Surgery text through several editions. His principal research interests have been trauma and burns, neonatal physiology and nutrition, oncology, biliary disorders, conjoined twins, vascular disorders and workforce issues. He has received honors from seven universities and a number of professional organizations including the Ladd Medal and the Salzberg Mentorship Award from the American Academy of Pediatrics. He has also given lectureships throughout the world. He has been involved in part-time humanitarian activities since 1972 in Central and South America, Africa and China, the latter with Project Hope for six years. Since 2006 Dr. O'Neill and his wife have been spending up to two months a year at Kijabe Hospital in Kenya working with colleagues in the development of the Vanderbilt surgical and educational program for African and Vanderbilt general and pediatric surgical trainees, doing clinical research and caring for Kenyan and Somali refugee children. In 2016, he received the International Surgical Volunteerism Award from the American College of Surgeons.

APSA 2017 Travel Fellows

Saturday, May 6 | 1:00 – 1:30 p.m.

Martin Situma, MD
Mbarara University of Science & Technology, Mbarara, Uganda

Development of a Pediatric Surgical Unit in a Resource-Constrained Setting in Western Uganda

Dr. Martin Situma is a pediatric surgeon working with Mbarara University of Science & Technology (MUST), Mbarara, Uganda, in collaboration with Bethany Relief and Rehabilitation International to oversee the introduction and daily running of pediatric surgery services. Uganda currently has only four practicing pediatric surgeons serving a population of about 38 million, 48 percent of which is under the age of 15. Situma is the only pediatric surgeon serving a largely rural population in West and Southwest Uganda and in parts of Rwanda and Congo. His professional goals include building a dedicated pediatric surgical ward with dedicated nurses; to create a dedicated pediatric surgery operating theatre; to continue teaching general surgery residents; and encouraging research and advocacy in pediatric surgery.

Sushil Dhungel, MD
Western Regional Hospital, Pokhara, Nepal

Pediatric Surgical Specialty in Nepal: Then and Now

Dr. Sushil Dhungel has been a pediatric surgeon for more than four years at Kanti Children's Hospital (KCH), Kathmandu Nepal, which is the only tertiary-level pediatric hospital with pediatric surgical facilities in Nepal. He sees a broad variety of patients with limited resources from various economic, social and cultural backgrounds. In spite of having 30 million residents in Nepal, there are a mere 16 registered pediatric surgeons working in the country. Dhungel is also involved with various other non-profit organizations such as ChildCare Nepal and Panacea Health Centre where he provides free medical and surgical camps in remote areas for poor and needy children. As Nepal continues to face great healthcare challenges, his professional goals center on improving the pediatric services offered with what resources are available; to implement the first laparoscopic center in the country for pediatric surgery at KCH; and to serve as a mentor for the next generation of surgeons.

APSA Past Meeting Lectures

Journal of Pediatric Surgery Lectures

2016
Michael W. Collins, PhD
Sport-Related Concussion: Moving in the Right Direction

2015
Robert W. Block, MD
All Adults Were Once Children

2014
Eric A. Rose, MD
Understanding Translational Research

2013
David B. Hoyt, MD
The American College of Surgeons Model for Quality Improvement

2012
Brad W. Warner, MD
Adaptation: Paradigm for an Academic Career and the Gut

2011
Professor Lewis Spitz
The History of Paediatric Surgery in the United Kingdom and the National Health Service

2010
Robert H. Bartlett, MD
ECMO: Gross, Beethoven, Krummel and Georgeson

2008
Thomas M. Krummel, MD
Inventing Our Future: Training the Next Generation of Surgeon Innovators

2007
Alan W. Flake, MD
Stem Cell Biology and Pediatric Surgery – Deciphering the Venn Diagram

2006
Pedro Rosselló, MD
The Unfinished Business of American Healthcare

2005
Alberto Peña, MD
Luck and Serendipity, the History of a Surgical Technique

2004
R. Scott Jones, MD
The American College of Surgeons Initiatives for Safety and Quality Improvement

APSA Past Meeting Lectures (cont.)

2003
Patricia K. Donahoe, MD
Sustained Inquiry and Perseverance in the Clinic and at the Bench

2002
Michael R. Harrison, MD
Fetal Surgery: Trials, Tribulations and Territory

2001
Joseph P. Vacanti, MD
The History and Current Status of Tissue Engineering

Robert E. Gross Lectures

2016
Mary E. Fallat, MD
Redefining Ladd's Path

2015
Robert S. Langer, ScD
Biomaterials and Biotechnology: from the Discovery of the First Angiogenesis Inhibitors to the Development of Controlled Drug Delivery Systems and the Foundation of Tissue Engineering

2014
Diana L. Farmer, MD
Standing on the Shoulders of Giants: From Singapore to Stem Cell Therapy

2013
Jorge D. Reyes, MD
Intestinal Transplantation: an Unexpected Journey

2012
Daniel M. Green, MD
The Evolution of Treatment of Wilms' Tumor

2011
Judson G. Randolph, MD
Notes on the Early Development of Pediatric Surgery in the United States

2010
John D. Birkmeyer, MD
Measuring and Improvement the Quality of Pediatric Surgery

2009
Stanley B. Prusiner, MD
Designer Prions and a Quest for Therapy

APSA Past Meeting Lectures (cont.)

2008
Michael W.L. Gauderer, MD
Creativity and the Surgeon

2007
Francisco G. Cigarroa, MD
Leading an Academic Health Center in the 21st Century: A Pediatric Surgeon's Perspective

2006
Diana Bianchi, MD
Fetomaternal Cell Trafficking: A Story that Begins with Prenatal Diagnosis and May End with Stem Cell Therapy

2005
W. Hardy Hendren, MD
Looking Back 50 Years

2004
Giulio (Dan) D'Angio, MD
The Role of the Surgeon in the Past, Present and Future of Pediatric Oncology

2003
Lucien Leape, MD
Safe Health Care — Are We Up to It?

2002
Harold Shapiro, PhD
The Ethical Dimensions of Scientific Progress

2001
M. Judah Folkman, MD
Angiogenesis-Dependent Diseases

2000
J. Bruce Beckwith, MD
Pediatric Renal Tumors at the New Millennium: Myths, Misunderstandings, Controversies and Opportunities

1999
Samuel A. Wells, Jr., MD
(Title not available)

1998
Richard M. Satava, MD
Medicine in the 21st Century

1997
Douglas W. Wilmore, MD
Will Organ Growth Replace Transplantation? Lessons from Patients with Short Bowel Syndrome

APSA Past Meeting Lectures (cont.)

1996
Robert H. Bartlett, MD
Surgery, Science and Respiratory Failure

1995
David A. Williams, MD
The Role of Interleukin-II on the Pathophysiology of the Small Intestine

1994
W. French Anderson, PhD
Human Gene Therapy

1993
M. Judah Folkman, MD
Clinical Applications of Angiogenesis Research

1992
Warren Zapol, MD
Inhaled Nitric Oxide: A Selective Vaso-Dilator

1991
Joel Cooper, MD
History and Current Status of Lung Transplantation

1990
Richard Simmons, MD
Role of the Gut Flora in Surgery

Jay & Margie Grosfeld Lectures

2016
Vinay Nadkarni, MD, MS
Resuscitating Resuscitation: Disruptive Innovations – Learning from the Past, Present and Toward a Brighter Future!

2015
Henri R. Ford, MD, MHA
Insights into the Pathogenesis of Necrotizing Enterocolitis: The Role of the Intestinal Microbiota

2014
Gail E. Besner, MD
A Pain in the NEC: Research Challenges and Opportunities

2013
Jessica J. Kandel, MD
Serendipity, Translational Research, High Quality Care, and the Children's Hospital

APSA Past Meeting Lectures (cont.)

2012
M. James Kaufman, PhD
Heath Care Reform – The Impact on Children

2011
Anthony Atala, MD
Regenerative Medicine: New Approaches to Healthcare

2010
Christopher K. Breuer, MD
The Development and Translation of the Tissue Engineered Vascular Grafts

2009
Michael T. Longaker, MD, MBA
Regenerative Medicine: A Surgeon's Perspective

2008
Frederick J. Rescorla, MD
What's New in Pediatric Surgery

International Guest Lectures

2015
Paul K.H. Tam, MBBS, ChM
Hirschsprung's Disease: a Bridge for Science and Surgery

2014
Professor Jacques Marescaux
Next Step in Minimally Invasive Surgery: Hybrid Image-Guided Surgery

2013
Agostino Pierro, MD
Across the Ocean: Perspectives for Clinical Care, Training and Research

2012
Benno M. Ure, MD
Enthusiasm, Evidence and Ethics: the Triple E of Minimally Invasive Pediatric Surgery

2011
Professor Takeshi Miyano, MD
A Brief History of Pediatric Surgery and Healthcare Delivery Systems in Japan

2010
Jan Alice Marcel Deprest, MD
Prenatal Management of the Fetus with Isolated CDH

2009
Marcelo Martinez Ferro, MD
New Approaches to Pectus and Other MIS in Argentina

APSA Past Meeting Lectures (cont.)

2008
Tadashi Iwanaka, MD
Technical Innovation, Standardization and Skill Qualification of Pediatric Minimally Invasive Surgery in Japan

2007
Claire Nihoul-Fékété, MD
Is Regionalism of Complex Pediatric Malformations Desirable and Feasible? The Example of Disorders of Sexual Development

2005
Prof. Frans W.J. Hazebroek, MD, PhD
Is Continuation of Life Support Always the Best Option for the Surgical Neonate?

2004
David A. Lloyd, MD
Tomorrow's Surgeons: Who Cares for the Patient?

2003
Claire Nihoul-Fékété, MD
Modern Surgical Management of Congenital Hyperinsulinemic Hypoglycemia

2002
Takeshi Miyano, MD
Biliary Tree: A Gardener's 30-Year Experience

2001
Pedro Rosselló, MD
One Nation, with Liberty and Justice…and Healthcare for All

2000
Leela Kapila, MD
Are These the Children of a Lesser God?

1999
Bernardo Ochoa, MD
Pediatric Surgery in Latin America

1998
Sidney Cywes, MD
Some of the Little Things We Do — Something Old, Something New

1997
Justin Kelly, MD
Bladder Exstrophy — Problems and Solutions

1996
Prem Puri, MD

APSA Past Meeting Lectures (cont.)

Variant Hirschsprug's Disease

1995
Sir Lewis Spitz, MD, PhD
Esophageal Atresia — Past, Present and Future

1994
Sean J. Corkery, MCh
In Pursuit of the Testis

1993
Edward M. Kiely, MD
The Surgical Challenge of Neuroblastoma

1992
Yann Revillon, MD
Intestinal Transplantation in France

1991
Shemuel Nissan, MD
The History of Surgery and Medicine in the Holy Land from the 19th Century

1990
Jan C. Molenaar, MD
Congenital Diaphragmatic Hernia — What Defect?

Plenary Lectures

2016
Mary L. Brandt, MD
Sustaining a Career

APSA 2017 Annual Meeting Program in Detail

Program in Detail

Thursday, May 4
Education Day

6:00 a.m. – 8:00 a.m.	**Committee Meetings** (see page 61 for Ancillary Meeting Schedule)	
6:30 a.m. – 7:30 a.m.	Continental Breakfast	*Great Hall 4 Foyer, 3rd Fl.*
6:30 a.m. – 2:00 p.m.	Poster Presenter Set-up	*Great Hall 3, 3rd Fl.*
6:30 a.m. – 5:00 p.m.	Registration Open	*Great Hall 4 Foyer, 3rd Fl.*
6:30 a.m. – 5:00 p.m.	Speaker Ready Room Open	*Great Hall Registration Desk, 3rd Fl.*
6:30 a.m. – 5:00 p.m.	Internet Café Open/Twitter Fall	*Great Hall 4 Foyer, 3rd Fl.*

President's Welcome

7:45 a.m. – 8:00 a.m. *Great Hall 4, 3rd Fl.*

Diana L. Farmer, MD

8:00 a.m. – 10:00 a.m.	Companion Hospitality Suite Open	*33rd Floor Lounge*

Education Session I: Surgeons as Educators and Leaders

8:00 a.m. – 11:00 a.m. *Great Hall 4, 3rd Fl.*

Moderators: Eunice Y. Huang, MD; Steven L. Lee, MD

Surgeons as Educators: How Surgeons Can Be Better Teachers

Presenter: Debra A. DaRosa, PhD

Learning Objectives

By the end of the presentation, attendees will be able to:

- Bridge the gap between what we know about the brain and how it relates to learning
- Outline instructional methods and environments that promote deep learning

Practical Tools for Effective Teaching

David A. Rogers, MD, MHPE

Learning Objectives

By the end of the presentation, attendees will be able to:

- Describe an effective approach to teaching medical students in the ambulatory clinic and operating room
- Create a novel curriculum for instructing pediatric residents about conditions requiring surgical therapy
- Outline a framework developed for teaching surgical residents in the operating room
- Formulate an approach to teaching pediatric surgery residents

Program in Detail (cont.)

Educating and Integrating Advance Practice Providers
Elizabeth A. Paton, MSN, RN-BC

Learning Objectives
By the end of the presentation, attendees will be able to:
- Decipher nursing alphabet soup
- Describe the academic training for nurse practitioners and physician assistants
- Outline strategies for promoting further clinical training and aiding advanced practice providers in their integration into the arena of pediatric surgery

Surgeons as Leaders and Communicators
Wolfgang Stehr, MD; Mark Rittenberg, PhD

Surgeons as Leaders
Learning Objectives
By the end of the presentation, attendees will be able to:
- Identify several classic leadership styles
- Choose from leadership styles that match various situations in health care
- Bring their authentic selves to interactions
- Apply the power of presence in different leadership situations
- Demonstrate that as surgeons we are always on the leadership stage

Surgeons as Communicators
Learning Objectives
By the end of the presentation, attendees will be able to:
- Apply new tools on how to use verbal and non-verbal communication
- Translate clinical curiosity to other interpersonal situations
- Communicate the importance of listening
- Create a deeper awareness and ability to avoid prejudice and accusations
- Implement communication skills to find better solutions in science

Panel Discussion

9:00 a.m. – 2:00 p.m. Exhibitor Set-up *Great Hall 3, 3rd Fl.*

Outcomes and Evidence-based Practice Committee Systematic Reviews
11:00 a.m. – Noon *Great Hall 4, 3rd Fl.*

Moderators: Cynthia D. Downard, MD, MMSc; Adam Goldin, MD, MPH

Current Management of Long Gap Esophageal Atresia
Dave R. Lal, MD, MPH; Robert J. Baird, MDCM, MSc; Robert L. Ricca, Jr., MD

Learning Objectives
By the end of the presentation, attendees will be able to:
- Define long gap esophageal atresia
- Apply methods of surgical repair for infants with long gap esophageal atresia

Program in Detail (cont.)

Thursday, May 4 (cont.)

- Identify new treatment strategies for long gap esophageal atresia
- Evaluate long-term outcomes after treatment of long gap esophageal atresia

Treatment of Solid Organ Injuries in Children

Regan F. Williams, MD, MS; Robert L. Gates, MD; Mitchell R. Price, MD

Learning Objectives

By the end of the presentation, attendees will be able to:

- Define the appropriate care of patients with solid organ injuries while in the hospital
- Address post-hospital care, activity and follow up of patients with solid organ injuries
- Evaluate the role of interventional radiology in the acute treatment of children with solid organ injury

Health Policy Update

Noon – 12:15 p.m. *Great Hall 4, 3rd Fl.*

Moderators: Max R. Langham, Jr., MD; David P. Bliss, Jr., MD

12:15 p.m. – 12:45 p.m. Box Lunch Pick-up *Great Hall Foyer, 3rd Fl.*

Case Debates and Controversies

12:45 p.m. – 2:15 p.m. *Great Hall 4, 3rd Fl.*

Moderator: Carroll M. Harmon, MD, PhD; Todd A. Ponsky, MD

Concurrent Education Session II: Parent and Family Education
Joint Session with American Pediatric Surgical Nurses Association

2:15 p.m. – 4:15 p.m. *Great Hall 4, 3rd Fl.*

Moderators: Romeo C. Ignacio Jr., MD; Kathleen M. Leack, MS, RN, CNS

Challenges in Patient Education and the APSA Patient Family Website

Promoting Health Literacy Practices in Pediatric Surgery

Kathleen M. Leack, MS, RN, CNS

Learning Objectives

By the end of the presentation, attendees will be able to:

- Explain the impact that health literacy has on health outcomes
- Describe approaches and use of health literacy tools during patient and family interaction and teaching sessions
- Apply health literacy concepts when developing teaching materials

Program in Detail (cont.)

A Technology-based Family Engagement Consultation Service

Gretchen Jackson, MD, PhD

Learning Objectives

By the end of the presentation, attendees will be able to:

- Enumerate the developmental stages of patient and caregiver activation
- Describe appropriate approaches to patient and family engagement for each developmental stage
- List examples of how health information technologies can be used to support patient engagement

Enhanced Postoperative Recovery in Pediatric Surgery

Kurt F. Heiss, MD

Learning Objectives

By the end of the presentation, attendees will be able to:

- Identify the components of ERAS program for pediatric colorectal surgery
- Engage the patient and family as partners to achieve successful outcomes

Panel Discussion

Concurrent Education Session III: Surgical Critical Care Committee Update

2:15 p.m. – 4:15 p.m. *Great Hall 1, 3rd Fl.*

Moderator: Pramod S. Puligandla, MD, MSc

Updates in Pediatric Sepsis Management

Samir K. Gadepalli, MS, MD, MBA; David H. Rothstein, MD, MS

Learning Objectives:

By the end of the presentation, attendees will be able to:

- Identify specific considerations in pediatric sepsis, focusing on appropriate early identification and management
- Explain the role of ECMO, and its specific technical considerations, in the treatment of pediatric sepsis
- Use checklists and electronic medical record-based early warning systems in the identification and treatment of pediatric sepsis

Updates in Fluid and Electrolyte Management

Ana Ruzic, MD; Kelly M. Austin, MD

Learning Objectives:

By the end of the presentation, attendees will be able to:

- Define the common isotonic and hypotonic fluids used in pediatric acute and critical care
- Analyze the short- and long-term risks associated with the use of hypotonic maintenance intravenous fluids as well as the rapid infusion of isotonic fluids
- Quote the rates of hospital-acquired hyponatremia with the use of hypotonic fluids
- Identify the physiologic changes that place surgical patients at risk for hyponatremia
- Develop evidence-based protocols for the patient-specific use of maintenance intravenous fluids

Program in Detail (cont.)

Thursday, May 4 (cont.)

Nutrition in Surgical Critical Care

Denise B. Klinkner, MD, Med; Jennifer H. Aldrink, MD

Learning Objectives:

By the end of the presentation, attendees will be able to:

- Initiate nutritional support early with minimal morbidity
- Compare lipid options to select appropriate formulations for different surgical diseases
- Explain the differences between maternal and donor expressed breast milk, including their respective benefits

Current Management of Pediatric Venous Thromboembolism

Robert L. Ricca, Jr., MD; David Juang, MD

Learning Objectives:

By the end of the presentation, attendees will be able to:

- Define the incidence of venous thromboembolism (VTE) in pediatric patients
- Describe the risk factors for pediatric VTE
- List the indications for VTE prophylaxis in pediatric patients
- Cite methods of monitoring pediatric coagulation (Thromboelastogram [TEG], rotational thromboelastometry [ROTEM])

Updates in Pediatric Burn Management

Mary K. Arbuthnot, DO; Alexander Feliz, MD

Learning Objectives:

By the end of the presentation, attendees will be able to:

- Describe innovations in initial burn resuscitation strategies
- Assess approaches to burn wound care
- Discuss the short- and long-term nutritional support specifically required for the pediatric burn patient

Current Issues in Pediatric Anesthesia, Analgesia and Sedation

Marla Matar, MD; David W. Bliss, MD

Learning Objectives:

By the end of the presentation, attendees will be able to:

- Define the differences between anesthesia, analgesia and sedation
- Assess the applications, risks and benefits of newer medications and select, non-pharmacologic methods used for analgesia and sedation
- Evaluate the current literature regarding anesthesia and neurotoxicity in children

3:00 p.m. – 5:30 p.m.	Exhibit Hall Open	*Great Hall 3, 3rd Fl.*
3:00 p.m. – 5:30 p.m.	Poster Hall Open	*Great Hall 3, 3rd Fl.*
4:15 p.m. – 5:15 p.m.	Wine and Cheese Reception in the Exhibit Hall	*Great Hall 3, 3rd Fl.*

Program in Detail (cont.)

Concurrent Oral Poster Presentations I: Basic Science

4:30 p.m. – 6:15 p.m. *Great Hall 1, 3rd Fl.*

Moderators: Samuel Z. Soffer, MD; Troy A. Markel, MD

P1

HEPARIN IMPAIRS COMPENSATORY LUNG GROWTH BY REDUCING THE ACTIVATION OF THE VASCULAR ENDOTHELIAL GROWTH FACTOR RECEPTOR

Duy T. Dao, MD, Jared Ourieff, MS, Lorenzo Anez-Bustillos, MD, Amy Pan, BA, Hiroko Kishikawa, PhD, Paul D. Mitchell, MSc, Meredith A. Baker, MD, Gillian L. Fell, MD, PhD, Hong Chen, PhD, Michael S. Rogers, PhD, Randolph Watnick, PhD, Diane R. Bielenberg, PhD, Mark Puder, MD, PhD.

Boston Children's Hospital, Boston, MA, USA.

P2

FETAL SURGICAL REPAIR OF MYELOMENINGOCELE USING A BIOENGINEERED EXTRACELLULAR MATRIX PATCH IN A RODENT MODEL: A FEASIBILITY STUDY

Y. Julia Chen, MD, Christopher Pivetti, MA, Sandra Kabagambe, MD, Karen Chung, BS, Zoe Saenz, BS, Lee Lankford, MA, Melissa Vanover, MD, Aijun Wang, PhD, Diana L. Farmer, MD.

University of California Davis Medical Center, Sacramento, CA, USA.

P3

ESOPHAGEAL SCAFFOLDS SEEDED WITH EPITHELIAL CELLS FOR ESOPHAGEAL REPLACEMENT THERAPY

Todd Jensen, MHS[1], Christine M. Finck, MD[2], Wael Sayej, MD[2].

[1]University of Connecticut Health Center, Farmington, CT, USA, [2]Connecticut Children's Medical Center, Hartford, CT, USA.

P4

FETAL REPAIR WITH PLACENTAL DERIVED MESENCHYMAL STROMAL CELL ENGINEERED PATCH LIMITS SPINAL CORD DAMAGE IN RODENT MODEL OF MYELOMENINGOCELE

Y. Julia Chen, MD, Christopher Pivetti, MA, Sandra Kabagambe, MD, Karen Chung, BS, Chelsey Lee, BA, Lee Lankford, MA, Melissa Vanover, MD, Aijun Wang, MD, Diana L. Farmer, MD.

University of California Davis Medical Center, Sacramento, CA, USA.

P5

PATIENT REPORTED LONG-TERM OUTCOMES IN CHILDREN WITH GASTROSCHISIS

Hope E. Arnold, BS[1], **Katherine J. Baxter, MD, MS**[1], Heather L. Short, MD[1], Curtis Travers, MPH[2], Amina M. Bhatia, MD, MS[1], Megan M. Durham, MD[1], Mehul V. Raval, MD, MS[1].

[1]Division of Pediatric Surgery, Department of Surgery, Emory University School of Medicine, Children's Healthcare of Atlanta, Atlanta, GA, USA, [2]Division of Pediatrics, Emory University School of Medicine, Atlanta, GA, USA.

Program in Detail (cont.)

Thursday, May 4 (cont.)

P6

REGENERATION OF FUNCTIONAL INTESTINAL EPITHELIUM USING HUMAN INDUCED PLURIPOTENT STEM CELLS ON A DECELLULARIZED MATRIX PLATFORM

Dana M. Schwartz, MD[1], Kentaro Kitano, MD[1], Haiyang Zhou, MD[2], Xi Ren, PhD[2], Allan M. Goldstein, MD[1], Harald C. Ott, MD[1].

[1]Massachusetts General Hospital, Department of Surgery, Boston, MA, USA, [2]Massachusetts General Hospital, Center for Regenerative Medicine, Boston, MA, USA.

P7

OMEGA-3 FATTY ACID CAN PREVENT THE DEVELOPMENT OF NECROTIZING ENTEROCOLITIS IN NEONATAL MICE

Hiromu Miyake, MD[1], Kathryn Hopperton, PhD[2], Yuhki Koike, MD[1], Yong Chen, MD[1], Bo Li, PhD[1], Carol Lee, MSc[1], Alison Hock, BSc[1], Richard Bazinet, PhD[2], Agostino Pierro, MD[1].

[1]The Hospital for Sick Children, Toronto, ON, Canada, [2]University of Toronto, Toronto, ON, Canada.

P8

LEVELS OF CIRCULATING ENDOTHELIAL PROGENITOR CELLS IN CONGENITAL DIAPHRAGMATIC HERNIA PATIENTS

John D. Stratigis, MD, Matthew M. Boelig, MD, Haiying Li, BS, Holly L. Hedrick, MD, N. Scott Adzick, MD, Alan W. Flake, MD, William H. Peranteau, MD.

The Children's Hospital of Philadelphia, Philadelphia, PA, USA.

P9

ELEVATED NEUTROPHIL ELASTASE, MATRIX METALLOPROTEINASE-2, TENASCIN-C, OSTEOPONTIN, AND EPIDERMAL GROWTH FACTOR ARE ASSOCIATED WITH PULMONARY HYPERTENSION IN NEONATES WITH CONGENITAL DIAPHRAGMATIC HERNIA

Cleo Jui-Hsia Hung, MD, Benjamin G. Wild, MSc, **Stephanie Langlois, PhD**, Kyle N. Cowan, **MD, PhD**.

Children's Hospital of Eastern Ontario, University of Ottawa, Ottawa, ON, Canada.

P10

CELL SEEDING AND CLINICAL SYMPTOMATOLOGY IN AN OVINE MODEL OF TISSUE-ENGINEERED TRACHEAL GRAFTS

Victoria K. Pepper, MD, Cameron A. Best, BA, Ekene A. Onwuka, MD, MS, Nakesha King, MD, Eric Heuer, BA, Joseph D. Drews, MD, Jed Johnson, PhD, Christopher K. Breuer, MD, Jonathan Grischkan, MD, Tendy Chiang, MD.

Nationwide Children's Hospital, Columbus, OH, USA.

P11

USE OF RADIOFREQUENCY ABLATION (RFA) FOR SELECTIVE FETAL REDUCTION IN MONOCHORIONIC PREGNANCIES AND OUTCOMES

Claire E. Graves, MD, Erin Washburn, MD, Derek Smith, BS, Angie C. Jelin, MD, Vickie A. Feldstein, MD.

University of California, San Francisco, San Francisco, CA, USA.

Program in Detail (cont.)

P12

EP2 RECEPTOR BLOCKADE PROTECTS AGAINST INTESTINAL BARRIER BREAKDOWN IN EXPERIMENTAL PERITONITIS

Jamie Golden, MD, Laura Illingworth, BS, Oswaldo Escobar, BS, Patil Kavarian, BS, Christopher P. Gayer, MD, PhD, Anatoly Grishin, PhD, Henri R. Ford, MD, MHA.

Children's Hospital of Los Angeles, Los Angeles, CA, USA.

P13

SHORT-TERM NEURODEVELOPMENTAL OUTCOME IN CHILDREN BORN WITH HIGH-RISK CONGENITAL LUNG LESIONS

Enrico Danzer, MD, Casey Hoffman, PhD, Jo Ann D'Agostino, DNP, CRNP, Matthew M. Boelig, MD, Marsha Gerdes, MD, Judy Bernbaum, MD, Natalie E. Rintoul, MD, Lisa Herkert, CRNP, Lindsay N. Waqar, MPH, William H. Peranteau, MD, Alan W. Flake, MD, N Scott Adzick, MD, Holly L. Hedrick, MD.

The Children's Hospital of Philadelphia, Philadelphia, PA, USA.

P14

ANALYSIS OF EXTRACELLULAR RNAS IN AMNIOTIC FLUID AND CORD BLOOD: A "PRECISION MEDICINE" APPROACH FOR FETAL THERAPY

Russell G. Witt, MD, MAS, Paula Godoy, BS, Michela Frascoli, PhD, Anita Grady, MD, Prescott Woodruff, MD, MPH, Tippi MacKenzie, MD.

University of California, San Francisco, San Francisco, CA, USA.

P15

FXR IS IMPORTANT IN CONTROLLING GLUCOSE HOMEOSTASIS AFTER SLEEVE GASTRECTOMY IN A MOUSE MODEL OF OBESITY

Monica D. Chow, MD[1], Andrew M. Wassef, BA, BS[2], Bo Kong, PhD[3], Jianliang Shen, MS[3], Laura E. Armstrong, PhD[3], Mingxing Huang, MD[4], Justin D. Schumacher, PharmD[3], Daniel Rizzolo, BA[3], Min Zhang, MD[5], Ragui W. Sadek, MD[6], Grace L. Guo, MBBS, PhD[3], Yi-Horng Lee, MD[7].

[1]Department of General Surgery, Rutgers-Robert Wood Johnson Medical School, New Brunswick, NJ, USA, [2]Rutgers-Robert Wood Johnson Medical School, New Brunswick, NJ, USA, [3]Department of Pharmacology and Toxicology, Ernest Mario School of Pharmacy, Rutgers University, Piscataway, NJ, USA, [4]Fifth Affiliated Hospital of Sun-Yat Sen University, Zhuhai, China, [5]Center of Children's Liver Disease, 302 Hospital of PLA, Beijing, China, [6]Department of Surgery, Rutgers-Robert Wood Johnson Medical School, New Brunswick, NJ, USA, [7]Division of Pediatric Surgery, Department of Surgery, Rutgers-Robert Wood Johnson Medical School, New Brunswick, NJ, USA.

P16

CONVERSION OF VENOVENOUS TO VENOARTERIAL CANNULATION INCREASES ECMO MORTALITY

Seth D. Goldstein, MD[1], Jose Salazar, MD[2], Nicholas Culbertson, BS[1], Vivian Wang, MD[3], Fizan Abdullah, MD, PhD[4], Alejandro Garcia, MD[1].

[1]Johns Hopkins Hospital, Baltimore, MD, USA, [2]University of Maryland Medical Center, Baltimore, MD, USA, [3]Emory School of Medicine, Atlanta, GA, USA, [4]Ann & Robert H. Lurie Children's Hospital, Chicago, IL, USA.

Program in Detail (cont.)

Thursday, May 4 (cont.)

P17

PULMONARY TRANSCRIPTOME ANALYSIS OF HUMAN CONGENITAL DIAPHRAGMATIC HERNIA 3D LUNG ORGANOIDS

Guihua Jiang, MS, Kendal A. Walker, BS, **Cory N. Criss, MD**, K. Sue O'Shea, PhD, Jason R. Spence, PhD, Shaun M. Kunisaki, MD, MSc.

University of Michigan, Ann Arbor, MI, USA.

Concurrent Oral Poster Presentations II: Clinical Surgery

4:30 p.m. – 6:15 p.m. *Great Hall 4, 3rd Fl.*

Moderators: Michael J. Goretsky, MD; Richard A. Falcone, MD

P18

RIGHT VS. LEFT CONGENITAL DIAPHRAGMATIC HERNIA — WHAT'S THE DIFFERENCE?

Carmen Mesas Burgos, MD, PhD[1], Björn Frenckner, MD, PhD[1], Matias Luco, MD[2], Pamela A. Lally, MD[3], Matthew T. Harting, MD[3], Kevin P. Lally, MD[3].

[1]Karolinska Institutet, Stockholm, Sweden, [2]Pontificia Universidad Católica, Santiago de Chile, Chile, [3]McGovern Medical School at UT Health and Children's Memorial Hermann Hospital, Houston, TX, USA.

P19

PREDICTORS OF PEDIATRIC BLUNT CEREBROVASCULAR INJURY

Avery C. Rossidis, MD[1], Sasha J. Tharakan, MD[1], Sourav K. Bose, MSc[2], Michael L. Nance, MD[1], Thane A. Blinman, MD[1].

[1]The Children's Hospital of Philadelphia, Philadelphia, PA, USA, [2]Perelman School of Medicine, Philadelphia, PA, USA.

P20

THE IMPACT OF RACIAL/ETHNIC DISPARITIES ON SURVIVAL FOR CHILDREN AND ADOLESCENTS WITH EXTREMITY SOFT TISSUE SARCOMA: A POPULATION-BASED STUDY

Michael Joseph, MPH[1], **Emma C. Hamilton, MD**[1], Winston W. Huh, MD[2], Andrea A. Hayes-Jordan, MD[2], Mary T. Austin, MD, MPH[2].

[1]McGovern Medical School, Houston, TX, USA, [2]The University of Texas MD Anderson Cancer Center, Houston, TX, USA.

P21

THE IDLE CENTRAL VENOUS CATHETER IN THE NICU: WHEN SHOULD THEY BE REMOVED?

Cristen N. Litz, MD, Jordan G. Tropf, BS, Paul D. Danielson, MD, Nicole M. Chandler, MD.

Johns Hopkins All Children's Hospital, St. Petersburg, FL, USA.

Program in Detail (cont.)

P22

IMPROVEMENTS IN VASCULAR HEALTH IN OBESE ADOLESCENTS AFTER SURGICAL WEIGHT LOSS

Andrew Morris, MD[1], Luke Timmons, PhD[1], Ritu Sachdeva, MD[2], Stephanie Walsh, MD[2], Luke Brewster, MD, PhD[1], Mark L. Wulkan, MD[2].

[1]Emory University Hospital, Atlanta, GA, USA, [2]Children's Hospital of Atlanta, Atlanta, GA, USA.

P23

PEDIATRIC VASCULAR TRAUMA PRACTICE PATTERNS SURVEY: A POSSIBLE GAP IN RESOURCES OF FREESTANDING CHILDREN'S HOSPITALS

Patrick C. Bonasso, MD[1], Samuel D. Smith, MD[1], Marie E. Saylors, MPH[2], R. Todd Maxson, MD[1], M. Sidney Dassinger, MD[1].

[1]University of Arkansas for Medical Sciences, Little Rock, AR, USA, [2]Arkansas Children's Research Institute, Little Rock, AR, USA.

P24

MORBIDITY AND MORTALITY AMONG "BIG" BABIES WHO DEVELOP NECROTIZING ENTEROCOLITIS — A PROSPECTIVE MULTICENTER COHORT ANALYSIS

Cristine S. Velazco, MD, MS[1], Brenna S. Fullerton, MD[1], Charles R. Hong, MD[1], Kate A. Morrow, MS[2], Erika M. Edwards, PhD, MPH[3], Roger F. Soll, MD[3], Tom Jaksic, MD, PhD[1], Jeffrey D. Horbar, MD[3], Biren P. Modi, MD[1].

[1]Boston Children's Hospital and Harvard Medical School, Boston, MA, USA, [2]Vermont Oxford Network, Burlington, VT, USA, [3]University of Vermont and Vermont Oxford Network, Burlington, VT, USA.

P25

MORE OF THE SAME: AGE AT ORCHIOPEXY FOR UNDESCENDED TESTIS IN THE UNITED STATES

Kibileri Williams, MD[1], Lauren M. Baumann, MD[1], Adil Shah, MD[2], Fizan Abdullah, MD, PhD[3], Tolulope A. Oyetunji, MD, MPH[1].

[1]Northwestern University Feinberg School of Medicine, Chicago, IL, USA, [2]Howard University School of Medicine, Washington, DC, USA, [3]Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA.

P26

OVERUTILIZATION OF ANTIBIOTICS IN ELECTIVE LAPAROSCOPIC CHOLECYSTECTOMY: NEED FOR BETTER STEWARDSHIP IN PEDIATRIC SURGERY

Kibileri Williams, MD[1], Lauren M. Baumann, MD[1], Adil Shah, MD[2], Fizan Abdullah, MD, PhD[3], Richard J. Hendrickson, MD[4], Shawn D. St Peter, MD[4], Tolulope A. Oyetunji, MD, MPH[1].

[1]Northwestern University Feinberg School of Medicine, Chicago, IL, USA, [2]Howard University Hospital, Washington, DC, USA, [3]Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA, [4]Children's Mercy Hospitals and Clinics, Kansas City, MO, USA.

Program in Detail (cont.)

Thursday, May 4 (cont.)

P27

OVERUTILIZATION OF ICU RESOURCES FOR ISOLATED LOW-GRADE SOLID ORGAN INJURIES TO THE ABDOMEN IN BLUNT PEDIATRIC TRAUMA

Adil A. Shah, MD[1], Kibileri Williams, MD[1], Fizan Abdullah, MD, PhD[2], Shawn D. St. Peter, MD[3], Tolulope A. Oyetunji, MD, MPH[4].

[1]Department of Surgery, Howard University Hospital and College of Medicine, Washington, DC, USA, [2]Division of Pediatric Surgery, Northwestern University Feinberg School of Medicine, Ann & Robert H. Lurie Children's Hospital, Chicago, IL, USA, [3]Division of Pediatric Surgery, Children's Mercy Hospitals and Clinics, Kansas City, MO, USA, [4]Division of Pediatric Surgery, Northwestern University Feinberg School of Medicine, Ann & Robert H Lurie Children's Hospital, Chicago, IL, USA.

P28

POSTOPERATIVE COMPLICATIONS FOR CHILDREN UNDERGOING PRIMARY MALIGNANT LIVER TUMOR RESECTION

Sarah J. Commander, BS, Yan Shi, MD, Sanjeev A. Vasudevan, MD.

Baylor College of Medicine, Houston, TX, USA.

P29

STAPLED INTESTINAL ANASTOMOSIS WITH ENDOSCOPIC STAPLERS IN PREMATURE INFANTS

Colin B. Muncie, MD, Loretta R. Cain, MPH, PhD, Barry R. Berch, MD, David E. Sawaya, MD, Christopher J. Blewett, MD.

University of Mississippi Medical Center, Jackson, MS, USA.

P30

A STRUCTURED BOWEL MANAGEMENT PROGRAM FOR PATIENTS WITH FUNCTIONAL CONSTIPATION CAN HELP DECREASE EMERGENCY DEPARTMENT VISITS, HOSPITAL ADMISSIONS AND HEALTHCARE COSTS

Carlos A. Reck, MD, **Alejandra Vilanova-Sanchez, MD**, Victoria A. Lane, MD, Alexander J.M. Dingemans, BSc, Onnalisa Nash, CPNP-PC, Steven Sales, MBA, Richard J. Wood, MD, Sarah Zobell, APRN, Michael Rollins, MD, Marc A. Levitt, MD.

Nationwide Children's Hospital, Columbus, OH, USA.

P31

VARIATIONS IN MANAGEMENT OF HIRSCHSPRUNG DISEASE: APSA SURVEY RESULTS

Tina T. Thomas, MBBS, Samir K. Gadepalli, MD, Niki Matusko, BSc, Peter F. Ehrlich, MD.

University of Michigan, Ann Arbor, MI, USA.

P32

THE DIAGNOSTIC POTENTIAL OF MULTIPHOTON MICROSCOPY FOR SOLID TUMORS IN CHILDREN

Lea Sibylle Waldron, MD, Jan Goedeke, MD, Claudius-Dominik Ries, MD, Lisa-Marie Sehls, MS, Frank Simon, PhD, **Oliver J. Muensterer, MD, PhD**.

University Medicine Mainz, Mainz, Germany.

Program in Detail (cont.)

P33

VARIABILITY IN PEDIATRIC BLUNT ABDOMINAL TRAUMA EVALUATION

Adam M. Vogel, MD[1], Jingwen Zhang, MS[2], Patrick D. Mauldin, PhD[2], Regan F. Williams, MD[3], Eunice Y. Huang, MD, MS[3], Matthew T. Santore, MD[4], Kuojen Tsao, MD[5], Richard A. Falcone, MD, MPH[6], M Sidney Dassinger, MD[7], Jeffrey H. Haynes, MD[8], Martin L. Blakely, MD, MS[9], Robert T. Russell, MD, MPH[10], Bindi J. Naik-Mathuria, MD, MPH[1], Shawn D. St Peter, MD, MPH[11], David Mooney, MD, MPH[12], Jeffrey S. Upperman, MD[13], Christian J. Streck, MD[2].

[1]Texas Children's Hospital, Houston, TX, USA, [2]Medical University of South Carolina, Charleston, SC, USA, [3]University of Tennessee Health Science Center at Memphis, Memphis, TN, USA, [4]Emory University School of Medicine, Atlanta, GA, USA, [5]University of Texas Health Science Center at Houston, Houston, TX, USA, [6]Cincinnati Children's Hospital, Cincinnati, OH, USA, [7]Arkansas Children's Hospital, Little Rock, AR, USA, [8]Virginia Commonwealth University, Richmond, VA, USA, [9]Vanderbilt University School of Medicine, Nashville, TN, USA, [10]University of Alabama Birmingham School of Medicine, Birmingham, AL, USA, [11]Children's Mercy Kansas City, Kansas City, MO, USA, [12]Boston Children's Hospital, Boston, MA, USA, [13]Children's Hospital Los Angeles, Los Angeles, CA, USA.

P34

AVALON CATHETERS IN PEDIATRIC PATIENTS REQUIRING ECMO: PLACEMENT AND MIGRATION ISSUES

Joseph T. Church, MD, Samir K. Gadepalli, MD, Ronald B. Hirschl, MD, George B. Mychaliska, MD, Marcus D. Jarboe, MD.

University of Michigan, Ann Arbor, MI, USA.

P35

TESTICULAR TUMORS IN PREPUBESCENT PATIENTS

Ilan I. Maizlin, MD[1], Kenneth W. Gow, MD[2], Adam Goldin, MD[2], Mehul V. Raval, MD[3], Melanie Goldfarb, MD[4], Monica Langer, MD[5], Jed G. Nuchtern, MD[6], Sanjeev A. Vasudevan, MD[6], John J. Doski, MD[7], Elizabeth A. Beierle, MD[1].

[1]Children's Hospital of Alabama, Birmingham, AL, USA, [2]Seattle Children's Hospital, Seattle, WA, USA, [3]Emory University, Atlanta, GA, USA, [4]John Wayne Cancer Institute at Providence - St. John's Health Center, Santa Monica, CA, USA, [5]Maine Children's Cancer Program, Tufts University, Portland, ME, USA, [6]Baylor College of Medicine, Texas Children's Hospital, Houston, TX, USA, [7]Methodist Children's Hospital of South Texas, University of Texas Health Science Center - San Antonio, San Antonio, TX, USA.

P36

REGIONAL VARIATION IN CANCER RELATED MORTALITY IN PEDIATRIC SOLID TUMORS

Michael P. La Quaglia, MD, **James Saltsman, MD**, Todd E. Heaton, MD, MPH, Anne Stey, MD.

Memorial Sloan Kettering Cancer Center, New York, NY, USA.

Display-Only Posters

These posters will be on display with the Oral Presentation Posters in the Exhibit Hall.

May 4, 3:00 – 5:30 p.m | May 5, 6:30 a.m. – 1:00 p.m. | May 6, 6:30 – 10:00 a.m.

Program in Detail (cont.)

Thursday, May 4 (cont.)

P37

ULTRASOUND-GUIDED GASTROSTOMY TUBE PLACEMENT: A CASE SERIES

Joseph T. Church, MD, Marcus D. Jarboe, MD.

University of Michigan, Ann Arbor, MI, USA.

P38

EFFECT OF RACE AND HISTOLOGY AT TIME OF PORTOENTEROSTOMY ON OUTCOMES FROM BILIARY ATRESIA

Jamie R. Robinson, MD[1], Jiancong Liang, MD[1], Patricia W. Costacurta, BS[2], Hernan Correa, MD[1], Lynette Gillis, MD[1], Harold N. Lovvorn III, MD[1].

[1]Vanderbilt University Medical Center, Nashville, TN, USA, [2]Vanderbilt University School of Medicine, Nashville, TN, USA.

P39

ROUTINE VERSUS SELECTIVE PATCH METAL ALLERGY TESTING BEFORE THE NUSS PROCEDURE

Robert J. Obermeyer, MD[1], **Sheema Gaffar, MS**[2], Robert E. Kelly, Jr., MD[1], Michele L. Lombardo, MD[1], Frazier W. Frantz, MD[1], M. Ann Kuhn, MD[1], Margaret M. McGuire, MD[1], Michael J. Goretsky, MD[3], James F. Paulson, PhD[4], Cynthia S. Kelly, MD[1].

[1]Children's Hospital of The King's Daughters, Norfolk, VA, USA, [2]Eastern Virginia Medical School, Norfolk, VA, USA, [3]Carolinas Health Care System, Charlotte, NC, USA, [4]Old Dominion University, Norfolk, VA, USA.

P40

ACHIEVING EXPERT CONSENSUS ON PRENATAL COUNSELING FOR CONGENITAL PULMONARY AIRWAY MALFORMATION AND CONGENITAL DIAPHRAGMATIC HERNIA USING THE DELPHI METHOD

Loren Berman, MD, MHS[1], Kristen Miller, DrPH, MSPH[2], Rebecca Kowalski[3], Jordan Jackson, MD[4], Francois Luks, MD, PhD[5].

[1]Nemours-A.I. duPont Hospital for Children, Wilmington, DE, USA, [2]The Value Institute at Christiana Care Health System, Newark, DE, USA, [3]University of Delaware, Newark, DE, USA, [4]UCSF, San Francisco, CA, USA, [5]Brown University, Providence, RI, USA.

P41

MALIGNANT TUMORS MISDIAGNOSED AS BENIGN VASCULAR MALFORMATION

Federico Scorletti, MD, Adrienne Hammill, MD, PhD, Manish Patel, DO, Kiersten Ricci, MD, Roshni Dasgupta, MD, MPH.

Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA.

P42

SUTURELESS CLOSURE OF GASTROSCHISIS REDUCES OPERATING ROOM USE, GENERAL ANESTHESIA AND VENTILATOR DAYS

David Grabski, MD, Yinin Hu, MD, Sara K. Rasmussen, MD, PhD, Eugene D. McGahren, MD, Jeffery W. Gander, MD.

University of Virginia, Charlottesville, VA, USA.

Program in Detail (cont.)

P43

COMPARISON OF EARLY VERSUS DELAYED STRATEGIES FOR REPAIR OF CDH ON ECMO

Jason O. Robertson, MD, MS[1], Cory N. Criss, MD[1], Lily B. Hsieh, MD[1], Niki Matsuko, BS[2], Josh S. Gish, MD[1], Rodrigo A. Mon, MD[1], Kevin N. Johnson, MD[1], George B. Mychaliska, MD[1], Ronald B. Hirschl, MD[1], Samir K. Gadepalli, MD, MS, MBA[1].

[1]C.S. Mott Children's Hospital/University of Michigan, Ann Arbor, MI, USA, [2]University of Michigan, Ann Arbor, MI, USA.

P44

IN-CONTINUITY DISTRACTION ENTEROGENESIS WITH THREE-DIMENSIONALLY PRINTED SPRING

Nhan T. Huynh, MD[1], Genia Dubrovsky, MD[1], Joshua D. Rouch, MD[1], Andrew Scott, MD[1], Elvin Chiang, BS[1], Tommy Nguyen[2], Benjamin M. Wu, DDS, PhD[2], Shant Shekherdimian, MPH, MD[1], James C.Y. Dunn, MD, PhD[3].

[1]Department of Surgery, David Geffen School of Medicine at University of California, Los Angeles, Los Angeles, CA, USA, [2]Department of Bioengineering, Henry Samueli School of Engineering, University of California, Los Angeles, Los Angeles, CA, USA, [3]Department of Surgery, Division of Pediatric Surgery, Stanford University, Stanford, CA, USA.

P45

USE OF AN ACCELERATED PATHWAY AMONG PATIENTS UNDERGOING POSTERIOR SAGITTAL ANORECTOPLASTY

Audrey Stokes, MD, Stephen Leung, BS, Dorothy Rocourt, MD.

Penn State Milton S. Hershey Medical Center, Hershey, PA, USA.

P46

UTILIZING TRAUMA VIDEO REVIEW (TVR) TO IMPROVE & ASSESS CLOSED-LOOP COMMUNICATION IN PEDIATRIC TRAUMA

Ibrahim Abd el-shafy, MD, Jennifer Delgado, Nathan A.M. Christopherson, MBA, Francesca Bullaro, MD, Jose M. Prince, MD.

Cohen Children's Medical Center, New Hyde Park, NY, USA.

P47

SIMULATION-BASED EDUCATION FOR ADVANCED PEDIATRIC MINIMALLY INVASIVE SURGERY: ENHANCING EXISTING TRAINING OPPORTUNITIES

Lauren Baumann, MD[1], Kibileri Williams, MD[1], Ben Schwab, MD[1], Katherine A. Barsness, MD, MS[2].

[1]Northwestern University Feinberg School of Medicine, Chicago, IL, USA, [2]Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA.

P48

WHY WAIT?: INITIATION OF EARLY ENTERAL FEEDING AFTER PEDIATRIC GASTROSTOMY TUBE PLACEMENT

Amanda R. Jensen, MD[1], Elizabeth J. Renaud, MD[2], Natalie A. Drucker, MD[1], Jessica Staszak, MD[3], Ayla Senay, BA[2], Vaibhavi Umesh, BA[2], Regan F. Williams, MD[3], Troy A. Markel, MD[1].

[1]Riley Hospital for Children, Indianapolis, IN, USA, [2]Montefiore Medical Center, Bronx, NY, USA, [3]Le Bonheur Children's Hospital, Memphis, TN, USA.

Program in Detail (cont.)

Thursday, May 4 (cont.)

P49

FAMILY HISTORY IS HIGHLY PREDICTIVE OF SURGICAL INTERVENTION BUT POORLY CORRELATED WITH BREAST MASS MALIGNANCY IN PEDIATRIC PATIENTS

Graham Englert, BS[1], **Guillermo Ares, MD**[2], Andrea Henricks, BS[1], Karen Rychlik, MS[2], Molly Reimann, BS[2], Ferdynand Hebal, MD[2], Catherine J. Hunter, MD[2].

[1]Northwestern University, Chicago, IL, USA, [2]Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, IL, USA.

P50

PREDICTORS OF OUTCOME IN FETUSES WITH OMPHALOCELE

Patricio E. Lau, MD, David A. Lazar, MD, Oluyinka O. Olutoye, MD, PhD, Candace C. Style, MD, Stephanie M. Cruz, MD, Christopher Cassady, MD, Stephen E. Welty, MD, Darrell L. Cass, MD.

Texas Children's Hospital-Baylor College of Medicine, Houston, TX, USA.

P51

UMBILICAL STROMAL CELLS MEDIATE INTESTINAL PROTECTION FOLLOWING ISCHEMIA/REPERFUSION INJURY BY NITRIC OXIDE DEPENDENT PATHWAYS

Amanda R. Jensen, MD, Natalie A. Drucker, MD, Sina Khaneki, MD, Troy Markel, MD.

Riley Hospital for Children, Indianapolis, IN, USA.

P52

PREDICTING RESPIRATORY INFECTIONS IN CHILDREN WITH CONGENITAL CYSTIC LUNG LESIONS WITH COMPUTED TOMOGRAPHY IMAGING

Lan T. Vu, MD, MAS, Derek Ulvila, MD, **Jarrett Moyer, MD**, Cynthia Tan, MD, Anatoly Urisman, MD, PhD, Kirk Jones, MD, Peter Marcovici, MD, Hanmin Lee, MD.

UC San Francisco, San Francisco, CA, USA.

P53

PRIMARY MEDIASTINAL GERM CELL TUMORS IN CHILDREN AND ADOLESCENTS: EVALUATION OF SURVIVAL AND PREDICTORS OF OUTCOME

William J. Hammond, MD, MS, Enrico Danzer, MD, James A. Saltsman, MD, MPH, Simon Berhe, BS, Anita P. Price, MD, Todd E. Heaton, MD, MPH, Michael P. La Quaglia, MD.

Memorial Sloan Kettering Cancer Center, New York, NY, USA.

P54

A PREDICTIVE MODEL FOR IMPROVED DISPOSITION OF PEDIATRIC TRAUMATIC BRAIN INJURY PATIENTS

Marcelo Cerullo, MPH, **Seth D. Goldstein, MD, MPhil**, Sandra DiBrito, MD, Corina Noje, MD, Susan Ziegfield, NP, Dylan Stewart, MD, Courtney Robertson, MD, Eric Jackson, MD, Isam W. Nasr, MD.

Johns Hopkins University, Baltimore, MD, USA.

7:00 p.m. – 9:00 p.m. Welcome Reception *Lagoon Pool Deck, Lobby Level*

Program in Detail (cont.)

Friday, May 5

6:00 a.m. – 8:00 a.m.	**Committee Meetings** (see page 61 for Ancillary Meeting Schedule)	
6:00 a.m. – 7:30 a.m.	APSA Foundation Board Meeting	*Room 320 S, 3rd Fl.*
6:30 a.m. – 7:30 a.m.	Continental Breakfast	*Great Hall 3, 3rd Fl.*
6:30 a.m. – 1:00 p.m.	Simulation Learning Center *(walk-up station; no registration required)*	*Great Hall 3, 3rd Fl.*
6:30 a.m. – 1:00 p.m.	Exhibit Hall Open	*Great Hall 3, 3rd Fl.*
6:30 a.m. – 1:00 p.m.	Poster Hall Open	*Great Hall 3, 3rd Fl.*
6:30 a.m. – 1:30 p.m.	Registration Open	*Great Hall 4 Foyer, 3rd Fl.*
6:30 a.m. – 1:30 p.m.	Speaker Ready Room Open	*Great Hall Registration Desk, 3rd Fl.*
6:30 a.m. – 1:30 p.m.	Internet Café Open/Twitter Fall	*Great Hall 4 Foyer, 3rd Fl.*
7:15 a.m. – 8:45 a.m.	Simulation Course: Thoracoscopic Lobectomy *(registration required, CME available)*	*Great Hall 2, 3rd Fl.*

Plenary Session I

7:30 a.m. – 9:00 a.m. *Great Hall 4, 3rd Fl.*

Moderators: Casey M. Calkins, MD; Henri R. Ford, MD, MHA

1

SINGLE VISIT SURGERY FOR PEDIATRIC AMBULATORY SURGICAL PROCEDURES: A SATISFACTION AND COST ANALYSIS

Jacob K. Olson, MD, Lisa A. Deming, RN, Denis R. King, MD, Terrence M. Rager, MD, MS, Sarah Gartner, BS, Natalie Huibregtse, BS, R. Lawrence Moss, MD, Gail E. Besner, MD.

Nationwide Children's Hospital, Columbus, OH, USA.

2

METABOLIC DYSFUNCTION AND BIOENERGETIC FAILURE IN NEONATAL NECROTIZING ENTEROCOLITIS

Tiffany J. Sinclair, MD[1], Dongyan Zhang, PhD[1], Bruce X. Ling, PhD[1], Claudia M. Mueller, MD, PhD[2], Harvey J. Cohen, MD, PhD[3], Karl G. Sylvester, MD[2].

[1]Department of Surgery, Stanford University School of Medicine, Stanford, CA, USA, [2]Division of Pediatric Surgery, Department of Surgery, Stanford University School of Medicine, Stanford, CA, USA, [3]Department of Pediatrics, Stanford University School of Medicine, Stanford CA, Stanford, CA, USA.

3

FETAL BONE MARROW HOMING OF DONOR MESENCHYMAL STEM CELLS AFTER TRANSAMNIOTIC STEM CELL THERAPY (TRASCET)

Hester F. Shieh, MD, Azra Ahmed, BS, Sarah A. Tracy, MD, David Zurakowski, PhD, Dario O. Fauza, MD, PhD.

Boston Children's Hospital, Boston, MA, USA.

Program in Detail (cont.)

Friday, May 5 (cont.)

4

SEVERE NEURODEVELOPMENTAL DISABILITY AND HEALTHCARE NEEDS AMONG SURVIVORS OF MEDICAL AND SURGICAL NECROTIZING ENTEROCOLITIS - A PROSPECTIVE COHORT STUDY

Brenna S. Fullerton, MD[1], Cristine S. Velazco, MD, MS[1], Charles R. Hong, MD[1], Charles E. Mercier, MD[2], Kate A. Morrow, MS[3], Erika M. Edwards, PhD, MPH[4], Karla R. Ferrelli, BA[3], Roger F. Soll, MD[4], Biren P. Modi, MD[1], Jeffrey D. Horbar, MD[4], Tom Jaksic, MD, PhD[1].

[1]Boston Children's Hospital and Harvard Medical School, Boston, MA, USA, [2]University of Vermont, Burlington, VT, USA, [3]Vermont Oxford Network, Burlington, VT, USA, [4]University of Vermont and Vermont Oxford Network, Burlington, VT, USA.

5

NEUROPROTECTION AND DEVELOPMENT IN EXTREMELY PREMATURE LAMBS SUPPORTED ON THE EXTRACORPOREAL ENVIRONMENT FOR NEONATAL DEVELOPMENT (EXTEND) DEVICE

Patrick E. McGovern, MD, Ali Y. Mejaddam, MD, Matthew A. Hornick, MD, Alexander J. Schupper, BA, Grace L. Hwang, BA, Emily A. Partridge, MD, PhD, Constantine D. Mavroudis, MD, Daniel J. Licht, MD, Judith B. Grinspan, MD, J. William Gaynor, MD, William H. Peranteau, MD, Marcus G. Davey, PhD, Alan W. Flake, MD.

The Children's Hospital of Philadelphia, Philadelphia, PA, USA.

6

EVALUATING THE UTILITY OF THE "LATE ECMO REPAIR": A CONGENITAL DIAPHRAGMATIC HERNIA STUDY GROUP INVESTIGATION

Ian C. Glenn, MD[1], Sophia Abdulhai, MD[1], Neil L. McNinch, MS, RN[1], Pamela A. Lally, MD[2], Todd A. Ponsky, MD[1], Avraham Schlager, MD[1].

[1]Akron Children's Hospital, Akron, OH, USA, [2]The University of Texas McGovern Medical School; Children's Memorial Hermann Hospital, Houston, TX, USA.

7

LAPAROSCOPIC GASTROESOPHAGEAL DISSOCIATION IN NEUROLOGICALLY IMPAIRED CHILDREN WITH RECURRENT GASTROESOPHAGEAL REFLUX

Jonathan H. DeAntonio, MD, Shannon F. Rosati, MD, Dan W. Parrish, MD, Claudio Oiticica, MD, David A. Lanning, MD.

Children's Hospital of Richmond at Virginia Commonwealth University School of Medicine, Richmond, VA, USA.

8

RHO KINASE INHIBITOR PROTECTS AGAINST CHANGES IN TIGHT JUNCTIONS INDUCED BY NECROTIZING ENTEROCOLITIS

Guillermo J. Ares, MD[1], Justyna S. Grothaus, MD[2], Carrie Y. Yuan, BS[2], Douglas R. Wood, BS[2], Catherine J. Hunter, MD[2].

[1]University of Illinois at Chicago and Northwestern University, Chicago, IL, USA, [2]Northwestern University, Chicago, IL, USA.

Program in Detail (cont.)

9

EFFECTIVE METHODS TO DECREASE SURGICAL SITE INFECTIONS IN PEDIATRIC GASTROINTESTINAL SURGERY

Andrew Nordin, MD, Stephen Sales, MBA, Gail E. Besner, MD, Marc A. Levitt, MD, Richard Wood, MD, Brian Kenney, MD, MPH.

Nationwide Children's Hospital, Columbus, OH, USA.

10

PLACENTAL MESENCHYMAL STROMAL CELLS SEEDED ON CLINICAL GRADE EXTRACELLULAR MATRIX IMPROVE AMBULATION IN OVINE MYELOMENINGOCELE

Sandra K. Kabagambe, MD, Benjamin A. Keller, MD, James C. Becker, MD, Laura F. Goodman, MD, Christopher D. Pivetti, MS, Lee Lankford, MA, Zoe Saenz, BS, Y Julia Chen, MD, Priyadarsini Kumar, PhD, Melissa A. Vanover, MD, Aijun Wang, PhD, Diana L. Farmer, MD.

University of California, Davis, Sacramento, CA, USA.

8:00 a.m. – 10:00 a.m. Companion Hospitality Suite Open *33rd Floor Lounge*

***Journal of Pediatric Surgery* Lecture/Presidential Address**

9:00 a.m. – 10:00 a.m. *Great Hall 4, 3rd Fl.*

Diana L. Farmer, MD

APSA President; Professor and Chair, Department of Surgery, Surgeon-in-Chief, UC Davis Children's Hospital UC Health, Sacramento, CA USA

Audacious Goals 2.0: The Global Initiative in Children's Surgery
Learning Objectives

By the end of the presentation, attendees will be able to:

- Describe the global burden of children's surgical disease
- Identify the unique challenges and potential solutions for pediatric surgeons in austere settings
- Determine the optimal resources needed for children's surgical care in low- and middle-income countries.
- Know what a "bananagram" is

10:00 a.m. – 10:30 a.m. Refreshment Break *Great Hall 3, 3rd Fl.*

Concurrent Scientific Session I: Enterocolitis, Sepsis, Basic Science

10:30 a.m. – Noon *Great Hall 4, 3rd Fl.*

Moderators: Anne C. Fischer, MD, PhD; Sean E. McLean, MD

Program in Detail (cont.)

Friday, May 5 (cont.)

11

HIRSCHSPRUNG-ASSOCIATED ENTEROCOLITIS SHARES GENETIC PATHWAYS WITH INFLAMMATORY BOWEL DISEASE

Talin Hartunians, PhD[1], Emebet Mengesha, PhD[1], Zhenqiu Liu, PhD[2], Tomas Wester, MD, PhD[3], Agneta Nordenskjöld, MD, PhD[4], Akemi L. Kawaguchi, MD[5], Daniel H. Teitelbaum, MD[6], Dermot P. McGovern, MD, PhD[1], **Philip K. Frykman, MD, PhD, MBA**[7].

[1]The F. Widjaja Foundation Inflammatory Bowel and Immunobiology Research Institute, Cedars-Sinai Medical Center, Los Angeles, CA, USA, [2]Biostatistics and Bioinformatics Research Center at the Cedars-Sinai Samuel Oschin Comprehensive Cancer Institute, Los Angeles, CA, USA, [3]Department of Pediatric Surgery, Astrid Lindgren's Children's Hospital, Karolinska University Hospital, Stockholm, Sweden, [4]Department of Women's and Children's Health and Center of Molecular Medicine-CMM, Karolinska Institute, Stockholm, Sweden, [5]Department of Pediatric Surgery, University of Texas Health Science Center Houston, Houston, TX, USA, [6]Division of Pediatric Surgery, C.S. Mott Children's Hospital, University of Michigan Medical School, Ann Arbor, MI, USA, [7]Division of Pediatric Surgery, Departments of Surgery and Biomedical Sciences Cedars-Sinai Medical Center, Los Angeles, CA, USA.

12

TOLERANCE INDUCTION AFTER IN UTERO HEMATOPOIETIC CELL TRANSPLANTATION IS DEPENDENT UPON A MINUTE SUBPOPULATION OF LINEAGE NEGATIVE CELLS

John D. Stratigis, MD[1], Nicholas J. Ahn, MD[1], Haiying Li, BS[1], Camila G. Fachin, MD, MSC[2], Andre I B S Dias, MD, PhD[2], Aimee G. Kim, MD[1], William H. Peranteau, MD[1], Stavros P. Loukogeorgakis, MD, PhD[3], Alan W. Flake, MD[1].

[1]The Children's Hospital of Philadelphia, Philadelphia, PA, USA, [2]Federal University of Paraná, Curitiba, Brazil, [3]Surgery Unit, Institute of Child Health, University College London, London, United Kingdom.

13

ORGAN INJURY AND INFLAMMATION ARE REDUCED IN THE ABSENCE OF RECEPTOR-INTERACTING PROTEIN KINASE 3 (RIPK3) IN NEONATAL SEPSIS

Laura W. Hansen, MD[1], Weng-Lang Yang, PhD[2], Alexandra C. Bolognese, MD[1], Jose M. Prince, MD[1], Jeffrey M. Nicastro, MD[1], Gene F. Coppa, MD[1], Ping Wang, MD[2].

[1]Northwell Health System, Manhasset, NY, USA, [2]Feinstein Institute for Medical Research, Manhasset, NY, USA.

14

PROPHYLACTIC ANTENATAL AND POSTNATAL N-ACETYL CYSTEINE CAN DECREASE INTESTINAL INFLAMMATION ASSOCIATED WITH NECROTIZING ENTEROCOLITIS IN A RAT MODEL

Osnat Zmora, MD[1], Zeev Weiner, MD[2], Ron Bilik, MD[3], Ron Beloosesky, MD[2].

[1]Sheba Medical Center, Ramat Gan, Israel, [2]Rambam Medical Center, Haifa, Israel, [3]Sheba Medical Center, Tel Aviv, Israel.

Program in Detail (cont.)

15

THE FORMATION OF NEUTROPHIL EXTRACELLULAR TRAPS IS INHIBITED BY PROSTAGLANDIN E2 DURING NECROTIZING ENTEROCOLITIS

Yuhki Koike, MD[1], Carol Lee, MSc[1], Bo Li, PhD[1], Augusto Zani, MD, PhD[1], Paolo De Coppi, MD[2], Simon Eaton, PhD[2], Agostino Pierro, MD[1].

[1]Division of General and Thoracic Surgery, The Hospital for Sick Children, Toronto, ON, Canada, [2]UCL Institute of Child Health and Great Ormond Street Hospital, London, United Kingdom.

16

HUMAN MILK OLIGOSACCHARIDES PROTECT THE INTESTINAL EPITHELIUM AND PREVENT EXPERIMENTAL NECROTIZING ENTEROCOLITIS

Yuhki Koike, MD[1], Richard Wu, PhD[2], Bo Li, PhD[1], Pekka Maattanen, PhD[2], Philip M. Sherman, MD[2], Agostino Pierro, MD[1].

[1]Division of General and Thoracic Surgery, The Hospital for Sick Children, Toronto, ON, Canada, [2]Division of Gastroenterology, Hepatology and Nutrition, The Hospital for Sick Children, Toronto, ON, Canada.

17

AMNIOTIC FLUID STEM CELL DERIVED EXOSOMES RESCUE LUNG EPITHELIUM PROLIFERATION AND ATTENUATE APOPTOSIS IN AN IN VITRO MODEL OF FETAL LUNG INJURY

Vincenzo D. Catania, MD, Jennifer Guadagno, PhD, Qi Ma, BSc, Bibek Saha, BSc, Bo Li, PhD, Augusto Zani, MD, PhD.

The Hospital for Sick Children, Toronto, ON, Canada.

18

A NOVEL TREATMENT TO PRESERVE FERTILITY IN FEMALE PATIENTS UNDERGOING CHEMOTHERAPY

Motohiro Kano, MD[1], Amanda Sosulski, MD[1], Lihua Zhang, BS[1], Nicholas Nagykery, BS[1], Dan Wang, PhD[2], Guangping Gao, PhD[2], Patricia K. Donahoe, MD[1], David Pépin, PhD[1].

[1]Pediatric Surgical Research Laboratories, Massachusetts General Hospital, Boston, MA, USA, [2]University of Massachusetts Medical School, Boston, MA, USA.

19

INTESTINAL HEMODYNAMICS AND POSTPARANDIAL HYPOXIA IN THE NEONATAL PERIOD

Yong Chen, MD, PhD, Yuhki Koike, MD, Lijun Chi, PhD, Hirumo Miyake, MD, Bo Li, PhD, Carol Li, MSc, Paul Delgado-Olguin, PhD, Agostino Pierro, MD.

The Hospital for Sick Children, Toronto, ON, Canada.

Program in Detail (cont.)

Friday, May 5 (cont.)

20

A COMPARISON OF LIPID MINIMIZATION STRATEGIES IN CHILDREN WITH INTESTINAL FAILURE

Jessica Gonzalez Hernandez, MD[1], Purvi Prajapati, BS[2], Gerald Ogola, PhD[2], Van Nguyen, CPNP[3], Nandini Channabasappa, MD[3], Hannah G. Piper, MD[3].

[1]Baylor University Medical Center, Dallas, TX, USA, [2]Baylor Scott and White Health, Dallas, TX, USA, [3]University of Texas Southwestern/Children's Health, Dallas, TX, USA.

Concurrent Scientific Session II: Appendicitis, General Pediatric Surgery

10:30 a.m. – Noon *Great Hall 1, 3rd Fl.*

Moderators: Shawn D. St. Peter, MD; Peter C. Minneci, MD

21

POSTERIOR TRACHEOPEXY FOR SEVERE TRACHEOMALACIA ASSOCIATED WITH ESOPHAGEAL ATRESIA (EA): PRIMARY TREATMENT AT THE TIME OF INITIAL EA REPAIR VERSUS SECONDARY TREATMENT

Hester F. Shieh, MD, C. Jason Smithers, MD, Thomas E. Hamilton, MD, David Zurakowski, PhD, Gary A. Visner, DO, Michael A. Manfredi, MD, Christopher W. Baird, MD, Russell W. Jennings, MD.

Boston Children's Hospital, Boston, MA, USA.

22

WITHDRAWN

23

EVALUATION OF A PROSPECTIVE SAME DAY DISCHARGE PROTOCOL FOR PEDIATRIC APPENDICITIS

Yangyang R. Yu, MD, Bindi J. Naik-Mathuria, MD, Sohail R. Shah, MD, Kimberly Ceyanes, PA-C, Jed G. Nuchtern, MD, Monica E. Lopez, MD.

Texas Children's Hospital, Department of Surgery, Baylor College of Medicine, Houston, TX, USA.

24

NAVEL GAZING: PRACTICE VARIATION IN UMBILICAL HERNIA REPAIR IN CHILDREN DEMONSTRATES A NEED FOR CONSENSUS BEST PRACTICES

Tiffany Zens, MD[1], Andrew Rogers, MD[1], Randi Cartmill, MS[1], Peter F. Nichol, MD[1], Daniel J. Ostlie, MD[2], Jonathan Kohler, MD[1].

[1]University of Wisconsin, Madison, WI, USA, [2]Phoenix Children's Hospital, Phoenix, AZ, USA.

Program in Detail (cont.)

25

RISK-ADJUSTED COMPARISON OF OPERATIVE AND NON-OPERATIVE MANAGEMENT FOR PERFORATED APPENDICITIS IN CHILDREN: IMPACT OF INITIAL TREATMENT APPROACH ON OVERALL COST

Mubina Isani, MD, Jeremy R. Jackson, MD, Jordan Bowling, MD, Grace Asuelime, MS, Alberto Chiccone, GED, Choo Phei Wee, MS, James E. Stein, MD, MS, Aaron R. Jensen, MD, MEd, Eugene S. Kim, MD.

Children's Hospital of Los Angeles, Los Angeles, CA, USA.

26

SAME DAY DISCHARGE AFTER APPENDECTOMY IN PEDIATRIC PATIENTS IS NOT ASSOCIATED WITH INCREASED UNANTICIPATED HOSPITAL REVISITS

Sarah B. Cairo, MD, MPH[1], Marybeth Browne, MD, MS[2], Mehul V. Raval, MD, MS[3], Holly Meyers, Clinical Reviewer[1], David H. Rothstein, MD, MS[1].

[1]Women and Children's Hospital of Buffalo, Buffalo, NY, USA, [2]Children's Hospital of the Lehigh Valley Health Network, Allentown, PA, USA, [3]Children's Hospital of Atlanta, Atlanta, GA, USA.

27

THE NUSS PROCEDURE: ADVANCES IN PAIN MANAGEMENT; MOVING TOWARDS ROUTINE DISCHARGE ON FIRST POST-OPERATIVE DAY

Long Nguyen, MD[2], **Marc G. Schlatter, MD**[1], Tedi Vlahu, MD[2], Maria Tecos, BS[3], Elle Kalbfell, BS[3], Omar Gonzalez-Vega, BS[3].

[1]Spectrum Health: Helen DeVos Children's Hospital, Grand Rapids, MI, USA, [2]Grand Rapids Medical Education Partners, Grand Rapids, MI, USA, [3]Michigan State University, College of Human Medicine, Grand Rapids, MI, USA.

28

PROSPECTIVE OBSERVATIONAL STUDY TO ASSESS THE NEED FOR POSTOPERATIVE ANTIBIOTICS FOLLOWING SURGICAL INCISION AND DRAINAGE OF SKIN AND SOFT TISSUE ABSCESS IN PEDIATRIC PATIENTS

Ian C. Glenn, MD, Nicholas E. Bruns, MD, Oliver S. Soldes, MD, Todd A. Ponsky, MD.

Akron Children's Hospital, Akron, OH, USA.

29

THE UTILITY OF ERCP IN PEDIATRIC PANCREATIC TRAUMA

Eric H. Rosenfeld, MD[1], Denise B. Klinkner, MD, MEd[2], Stephanie Polites[2], Mauricio Escobar, MD[3], Adam Pattyn, MD[3], Barbara Gaines, MD[4], Christine Leeper, MD[4], Ankush Gosain, MD, PhD[5], Laura V. Veras, MD[5], Robert Russell, MD,MPH[6], Ilan Maizlin, MD[6], Brendan Campbell, MD, MPH[7], Shefali Thaker, MD[7], Hale Wills, MS, MD[8], Alexis Smith, MD[8], Anthony Stallion, MD[9], Megan Waddell[9], Shawn St. Peter, MD[10], David Juang, MD[10], Rajan Thakkar, MD[11], Joseph Drews, MD[11], Adam Vogel, MD[12], Rita V. Burke, PhD, MPH[13], Michael Malicote, MD[13], James Gilmore, MD[14], Mubeen Jafri, MD[14,22], David Mooney, MD, MPH[15], Lindsey Armstrong, MD[15], Randall Burd, MD, PhD[16], Stephen J. Fenton, MD[17], Marianne Beaudin, MD[18], Laurence Carmant[18], Richard A. Falcone Jr., MD[19], MPH, Suzanne Moody[19], Nathaniel Kreykes MD[20], Heidi Vander Velden, MS[20], Jose M. Prince[21], MD, Ibrahim Abd el-shafy, MD[21], Brandon Behrens, MD[22], Bindi J. Naik-Mathuria, MD[1].

[1]Texas Children's Hospital and the Michael E. DeBakey Department of Surgery, Houston, TX, USA, [2]Mayo Clinic, Rochester, MN, USA, [3]MultiCare Mary Bridge Children's Hospital &

Program in Detail (cont.)

Friday, May 5 (cont.)

Health Center, Tacoma, WA, USA, [4]Children's Hospital of Pittsburgh, Pittsburgh, PA, USA, [5]Le Bonheur Children's Hospital, Memphis, TN, USA, [6]Children's of Alabama, Birmingham, AL, USA, [7]Connecticut Children's Medical Center, Hartford, CT, USA, [8]Hasbro Children's Hospital, Providence, RI, USA, [9]Carolinas HealthCare System, Charlotte, NC, USA, [10]Children's Mercy Hospital, Kansas City, MO, USA, [11]Nationwide Children's Hospital, Columbus, OH, USA, [12]Saint Louis Children's Hospital, St. Louis, MO, USA, [13]Children's Hospital of Los Angeles, CA, USA, [14] Randall Children's Hospital at Oregon Health & Science University, Portland, OR, USA, [15]Boston Children's Hospital, Boston, MA, USA, [16]Children's National Medical Center, Washington, DC, USA, [17]University of Utah, Salt Lake City, UT, USA, [18]Centre Hospitalier Universitaire Sainte-Justine, Montreal QC, Canada, [19]Cincinnati Children's, Cincinnati, OH, USA, [20]Children's Hospital of Minnesota, Minnesota, MN, USA, [21]Cohens Children's Medical Center, New Hyde Park, NY, USA, [22]Doernbecher Children's Hospital Oregon Health and Science University, Portland, OR, USA.

30

EXPANDING THE INCLUSION CRITERIA FOR NON-OPERATIVE MANAGEMENT OF UNCOMPLICATED APPENDICITIS: OUTCOMES AND COST

Steven L. Lee, MD[1], Kyle Mock, MD[1], James X. Wu, MD[2], Huan Yan, MD[1], Lara H. Spence, MD[1], Daniel A. DeUgarte, MD[1].

[1]Harbor-UCLA Medical Center, Torrance, CA, USA, [2]UCLA, Los Angeles, CA, USA.

31

A PEDIATRIC APPENDICITIS PATHWAY THAT INCLUDES ANTIBIOTIC THERAPY AND/OR SURGERY RESULTS IN IMPROVED PERFORATION AND NEGATIVE APPENDECTOMY RATES WHILE DECREASING THE RATES OF UNNECESSARY CT AND SURGERY

Sidney M. Johnson, MD, Devin P. Puapong, MD, Russell K. Woo, MD.

Kapiolani Medical Center for Children, Honolulu, HI, USA.

Noon – 12:15 p.m. Refreshment Break *Great Hall 4 Foyer, 3rd Fl.*

Concurrent Scientific Session III: Trauma, Reproductive, GI

12:15 p.m. – 1:30 p.m. *Great Hall 4, 3rd Fl.*

Moderators: Aaron M. Lipskar, MD; KuoJen Tsao, MD

32

SCLEROTHERAPY FOR THE MANAGEMENT OF RECTAL PROLAPSE IN CHILDREN

Scott C. Dolejs, MD, Justin Sheplock, BS, Robert J. Vandewalle, MD, **Matthew P. Landman, MD, MPH**, Frederick J. Rescorla, MD.

Indiana University Health, Indianapolis, IN, USA.

33

PRIMARY OR REDO PSARP WITHOUT A STOMA: TO FEED OR NOT TO FEED?

Alessandra Gaisor, DO, Carlos A. Reck, MD, Victoria A. Lane, MD, Claire Skerritt, MD, Andrea Wagner, CPNP-PC, Alejandra Vilanova, MD, Alexander J.M. Dingemans, BSc, Nicole Jenkins, ANP, Richard J. Wood, MD, Marc A. Levitt, MD.

Nationwide Children's Hospital, Columbus, OH, USA.

Program in Detail (cont.)

34

VARIABILITY OF CHILD ACCESS PREVENTION LAWS AND PEDIATRIC FIREARM INJURIES

Emma C. Hamilton, MD, Charles C. Miller, III, PhD, Charles S. Cox, MD, Kevin P. Lally, MD, MS, Mary T. Austin, MD, MPH.

McGovern Medical School at the University of Texas Health Science Center at Houston Medical School, Houston, TX, USA.

35

A MULTICENTER PROSPECTIVE ANALYSIS OF HIGHEST LEVEL TRIAGE EFFICACY IN PEDIATRIC PATIENTS FOLLOWING BLUNT ABDOMINAL TRAUMA

Regan Williams, MD[1], Adam M. Vogel, MD[2], Richard A. Falcone, MD, MPH[3], Melvin S. Dassinger, MD[4], Jeffrey H. Haynes, MD[5], Eunice Y. Huang, MD, MS[1], Patrick Mauldin, PhD[6], David Mooney, MD, MPH[7], Bindi Naik-Mathuria, MD[8], Robert T. Russell, MD, MS[9], Matthew Santore, MD[10], Shawn D. St. Peter, MD[11], Kuojen Tsao, MD[12], Jeffrey S. Upperman, MD[13], Renaldo Williams, MD[14], Jingwen Zhang, MS[6], Christian J. Streck, MD[6].

[1]University of Tennessee Health Science Center, Memphis, TN, USA, [2]Baylor College of Medicine, Houston, TX, USA, [3]Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA, [4]University of Arkansas for Medical Sciences, Little Rock, AR, USA, [5]Children's Hospital of Richmond, Richmond, VA, USA, [6]Medical University of South Carolina, Charleston, SC, USA, [7]Boston's Children's Hospital, Boston, MD, USA, [8]Texas Children's Hospital, Houston, TX, USA, [9]University of Alabama, Birmingham, AL, USA, [10]Emory University, Atlanta, GA, USA, [11]Children's Mercy Hospital and Clinics, Kansas City, MO, USA, [12]University of Texas Health Science Center, Houston, TX, USA, [13]Children's Hospital of Los Angeles, Los Angeles, CA, USA, [14]Vanderbilt University Medical Center, Nashville, TN, USA.

36

THE SAFETY AND EFFICACY OF OVARIAN TISSUE CRYOPRESERVATION IN YOUNG FEMALES WITH CANCER

Jeffrey R. Lukish, MD, Mindy Christianson, MD, Dominic J. Papandria, MD, Amany Isaac, MD, Howard Pryor, MD, Fizan Abdullah, MD, PhD, Heather Symons, MD, Kathy Ruble, PhD.

The Johns Hopkins University, Baltimore, MD, USA.

37

USING QUALITY IMPROVEMENT METHODOLOGY TO IMPROVE OVARIAN SALVAGE FOR BENIGN OVARIAN MASSES

Jennifer H. Aldrink, MD[1], Stephen P. Sales, MBA[2], Katherine J. Deans, MD, MHSc[1], Gail E. Besner, MD[1], Geri D. Hewitt, MD[1].

[1]The Ohio State University College of Medicine, Nationwide Children's Hospital, Columbus, OH, USA, [2]Nationwide Children's Hospital, Columbus, OH, USA.

38

VALIDATION OF THE AGE-ADJUSTED SHOCK INDEX USING PEDIATRIC TRAUMA QUALITY IMPROVEMENT PROGRAM DATA

Andrew Nordin, MD[1], Alan Coleman, MD[1], Junxin Shi, MD, PhD[1], Krista Wheeler, MS[1], Shannon Acker, MD[2], Huiyun Xiang, MD, PhD[1], Denis Bensard, MD[3], Brian Kenney, MD, MPH[1].

[1]Nationwide Children's Hospital, Columbus, OH, USA, [2]University of Colorado School of Medicine, Aurora, CO, USA, [3]Children's Hospital Colorado, Aurora, CO, USA.

Program in Detail (cont.)

Friday, May 5 (cont.)

39

THE ROLE OF TLR-4 IN THE PATHOGENESIS OF TRAUMATIC BRAIN INJURY IN MICE

Jose C. Alonso-Escalante, MD[1], Diala F. Hamade, MS[2], William Fulton, MS[1], Chhinder P. Sodhi, PhD[1], David J. Hackam, MD, PhD[1], Isam W. Nasr, MD[1].

[1]Johns Hopkins University School of Medicine, Baltimore, MD, USA, [2]American University of Beirut School of Medicine, Beirut, Lebanon.

40

DEVELOPMENT AND VALIDATION OF A NEW PEDIATRIC RESUSCITATION AND TRAUMA OUTCOME (PRESTO) SCORE USING THE U.S. NATIONAL TRAUMA DATA BANK

Etienne St-Louis, MDCM, MSc, PhD(c)[1], Robert J. Baird, MDCM, MSc[1], Tarek Razek, MDCM[1], James A. Hanley, PhD[2].

[1]McGill University Health Centre, Montreal, QC, Canada, [2]McGill University, Montreal, QC, Canada.

Concurrent Scientific Session IV: CDH/ECMO, Neonatal Surgery, Thoracic

12:15 p.m. – 1:30 p.m. *Great Hall 1, 3rd Fl.*

Moderators: Andre Hebra, MD; Shaun M. Kunisaki, MD, MSc

41

DEVELOPMENT AND VALIDATION OF PRE- AND ON-ECMO MORTALITY-RISK MODELS FOR CONGENITAL DIAPHRAGMATIC HERNIA

Yigit S. Guner, MD[1], Danh Nguyen, PhD[2], Lishi Zhang, MS[2], Yanjun Chen, MS[2], Matthew T. Marting, MD[3], Matteo Di Nardo, MD[4], John Cleary, MD[5], Peter T. Yu, MD[1].

[1]Children's Hospital of Orange County/University of California Irvine, Orange, CA, USA, [2]University of California Irvine, Orange, CA, USA, [3]University of Texas McGovern Medical School and Children's Memorial Hermann Hospital, Houston, TX, USA, [4]Ospedale Pediatrico Bambino Gesu, Rome, Italy, [5]Children's Hospital of Orange County, Orange, CA, USA.

42

AMNIOTIC FLUID STEM CELL DERIVED EXOSOMES: A NOVEL THERAPEUTIC STRATEGY FOR LUNG HYPOPLASIA IN CONGENITAL DIAPHRAGMATIC HERNIA

Vincenzo D. Catania, MD, Jennifer Guadagno, PhD, Bibek Saha, BSc, Qi Ma, BSc, Alyssa Belfiore, BSc, Yuhki Koike, MD, PhD, Bo Li, PhD, Augusto Zani, MD, PhD.

The Hospital for Sick Children, Toronto, ON, Canada.

43

OUTCOMES OF CONTINUOUS ELECTROENCEPHALOGRAPHIC MONITORING ON PEDIATRIC EXTRACORPOREAL MEMBRANE OXYGENATION PATIENTS

Shunpei Okochi, MD, Jennifer M. Bain, MD, PhD, Cherease Street, BS, Aqsa Shakoor, MD, Svetlana Streltsova, RN, MSN, CCRN, Gudrun Aspelund, MD, Eva W. Cheung, MD, William Middlesworth, MD.

Columbia University Medical Center, New York, NY, USA.

Program in Detail (cont.)

44

VALIDATION OF AN EXTRACORPOREAL MEMBRANE OXYGENATION (ECMO) RISK PREDICTION MODEL IN NEWBORNS WITH CONGENITAL DIAPHRAGMATIC HERNIA (CDH)

Tim Jancelewicz, MD, MA[1], Elizabeth A. Tolley, PhD[2], Mary E. Brindle, MD, MPH[3], Matthew T. Harting, MD, MS[4], Max R. Langham Jr., MD[1], Pamela A. Lally, MD[4], David W. Kays, MD[5].

[1]University of Tennessee Health Science Center and Le Bonheur Children's Hospital, Memphis, TN, USA, [2]University of Tennessee Health Science Center Department of Preventive Medicine, Memphis, TN, USA, [3]University of Calgary and Alberta Children's Hospital, Calgary, AB, Canada, [4]University of Texas McGovern Medical School and Children's Memorial Hermann Hospital, Houston, TX, USA, [5]Johns Hopkins University School of Medicine and Johns Hopkins All Children's Hospital, St. Petersburg, FL, USA.

45

THORACOSCOPIC MANAGEMENT OF NON TYPE C ESOPHAGEAL ATRESIA AND TRACHEOESOPHAGEAL FISTULA

Steven S. Rothenberg, MD.

The Rocky Mountain Hospital for Children, Denver, CO, USA.

46

LAPAROSCOPIC SURGERY IN NEONATES UNDER SPINAL ANESTHESIA: OUR INITIAL EXPERIENCE

Katharine R. Bittner, MD, Kaitlyn E. Wong, MD, Erica D. Kane, MD, Jennifer Friderici, MS, Gregory T. Banever, MD, David B. Tashjian, MD, Kevin P. Moriarty, MD, Donald A. Schwartz, MD, Michael V. Tirabassi, MD.

Baystate Medical Center, Springfield, MA, USA.

47

SURGICAL OUTCOMES FOR CONGENITAL LUNG MALFORMATIONS: COMPARISON OF EXIT-TO-RESECTION VS. URGENT OR ELECTIVE POSTNATAL OPERATIONS

Candace C. Style, MD, Stephanie M. Cruz, MD, Oluyinka O. Olutoye, MD, PhD, Patrico E. Lau, MD, Irving J. Zamora, MD, Timothy C. Lee, MD, Rodrigo Ruano, MD, PhD, Stephen E. Welty, MD, Sundeep G. Keswani, MD, Darrell L. Cass, MD.

Texas Children's Hospital, Baylor College of Medicine, Houston, TX, USA.

48

POST-OPERATIVE METRICS AND RISK FOR PLEUROPULMONARY BLASTOMA FAVOR RESECTION OF CONGENITAL PULMONARY AIRWAY MALFORMATIONS PRIOR TO THE ONSET OF SYMPTOMS

Robert J. Vandewalle, MD, MBA[1], Joseph C. Easton, BS[2], Brian W. Gray, MD[1], Frederick J. Rescorla, MD[1].

[1]Department of Surgery, Section of Pediatric Surgery; Indiana University School of Medicine, Indianapolis, IN, USA, [2]Indiana University School of Medicine, Indianapolis, IN, USA.

Program in Detail (cont.)

49

CLOACA REPAIR: A NEW ALGORITHM WHICH CONSIDERS THE ROLE OF URETHRAL LENGTH IN DETERMINING SURGICAL PLANNING

Richard J. Wood, MD, Marc A. Levitt, MD.

Nationwide Children's Hospital, Columbus, OH, USA.

1:00 p.m. – 2:30 p.m.	Simulation Course: Thoracoscopic TEF Repair *(registration required, CME available)*	*Great Hall 2, 3rd Fl*.
1:30 p.m.	Leisure Time	
1:30 p.m. – 3:30 p.m.	Benjy Brooks Luncheon *(pre-registration required)*	*Room 307, N, 3rd Fl.*
4:30 p.m. – 5:30 p.m.	Residents Reception	*Room 320, S, 3rd Fl.*
5:00 p.m. – 6:30 p.m.	*Journal of Pediatric Surgery* Reception *(by invitation)*	*Room 307, N, 3rd Fl.*
6:30 p.m. – 7:00 p.m.	New Member Rehearsal *(by invitation)*	*Great Hall 4, 3rd Fl.*

Program in Detail (cont.)

Saturday, May 6

6:00 a.m. – 4:00 p.m.	Registration Open	*Great Hall 4 Foyer, 3rd Fl.*
6:00 a.m. – 4:00 p.m.	Speaker Ready Room Open	*Great Hall Registration Desk, 3rd Fl.*
6:00 a.m. – 4:00 p.m.	Internet Café Open/Twitter Fall	*Great Hall 4 Foyer, 3rd Fl.*
6:30 a.m. – 8:00 a.m.	Continental Breakfast	*Great Hall 3, 3rd Fl.*
6:30 a.m. – 10:00 a.m.	Simulation Learning Center *(walk-up station; no registration required)*	*Great Hall 3, 3rd Fl.*
6:30 a.m. – 10:00 a.m.	Exhibit Hall Open	*Great Hall 3, 3rd Fl.*
6:30 a.m. – 10:00 a.m.	Poster Hall Open	*Great Hall 3, 3rd Fl.*
7:00 a.m. – 8:00 a.m.	Business Meeting – all are welcome	*Great Hall 4, 3rd Fl.*
7:30 a.m. – 9:00 a.m.	Simulation Course: Thoracoscopic Lobectomy *(registration required, CME available)*	*Great Hall 2, 3rd Fl.*

Innovation Session

8:00 a.m. – 9:00 a.m. *Great Hall 4, 3rd Fl.*

Moderators: Stefan Scholz, MD; Erik D. Skarsgard, MD

i1

PREDICTING THE NEED FOR ECMO IN NEONATES WITH CONGENITALDIA-PHRAGMATIC HERNIA WITH A NOVEL MULTIMODAL COMPUTATIONAL SYSTEM USING NEAR-INFRARED SPECTROSCOPY

Stephanie M. Cruz, MD, Patricio E. Lau, MD, Darrell L. Cass, MD, Candace C. Style, MD, Craig G. Rusin, PhD, Timothy C. Lee, MD, Christopher J. Rhee, MD, Sundeep G. Keswani, MD, Rodrigo Ruano, MD, PhD, Stephen E. Welty, MD, Oluyinka O. Olutoye, MD, PhD.

Baylor College of Medicine/Texas Children's Hospital, Houston, TX, USA.

i2

THREE-DIMENSIONALLY PRINTED SURFACE FEATURES TO ANCHOR ENDOLUMINAL SPRING FOR DISTRACTION ENTEROGENESIS

Nhan T. Huynh, MD[1], Genia Dubrovsky, MD[1], Joshua D. Rouch, MD[1], Andrew Scott, MD[1], Elvin Chiang, MD[1], Tommy Nguyen[2], Benjamin M. Wu, DDS, PhD[2], Shant Shekherdimian, MPH, MD[1], James C.Y. Dunn, MD, PhD[3].

[1]Department of Surgery, David Geffen School of Medicine at University of California, Los Angeles, Los Angeles, CA, USA, [2]Department of Bioengineering, Henry Samueli School of Engineering, University of California, Los Angeles, Los Angeles, CA, USA, [3]Department of Surgery, Division of Pediatric Surgery, Stanford University, Stanford, CA, USA.

Program in Detail (cont.)

Saturday, May 6 (cont.)

i3

DEVELOPMENT OF AN ENGINEERED INTESTINE USING A NOVEL BIOENGINEERED SCAFFOLD IN A PIGLET MODEL WITH DEMONSTRATION OF CRYPT GROWTH, DIFFERENTIATION, AND VASCULOGENESIS

Laura Y. Martin, MD[1], Mitchell R. Ladd, MD[1], John C. March, PhD[2], Cait Costello, PhD[2], Hongpeng Jia, MD[1], Sodhi P. Chhinder, PhD[1], Adam Werts, DVM[1], Peng Lu, PhD[1], Diego F. Nino, MD[1], Emilyn Banfield, BS[1], Quinjie Zhou, PhD[1], William Fulton, MS[1], Jungeun Sung, BS[1], Thomas Prindle, BS[1], David J. Hackam, MD, PhD[1].

[1]Johns Hopkins Hospital, Baltimore, MD, USA, [2]Cornell University, Ithaca, NY, USA.

i4

MAGNETIC APNEA PREVENTION DEVICE FOR OBSTRUCTIVE SLEEP APNEA

Claire E. Graves, MD, Philip B. Fullante, MD, Catherine Co, MD, Dillon Kwiat, BS, Jill Imamura-Ching, RN, Andrew Murr, MD, Jolie Chang, MD, Michael R. Harrison, MD.

University of California, San Francisco, San Francisco, CA, USA.

i5

BEYOND THE SPACE OF REX: ADVANCING MESOPORTAL RECONSTRUCTION

Stephen P. Dunn, MD[1], Warren Maley, MD[2], Abigail E. Martin, MD[1], Jeremiah Sabado, MD[1], Deborah Rabinowitz, MD[1].

[1]Al DuPont Hospital for Children, Wilmington, DE, USA, [2]Sidney Kimmel School of Medicine, Philadelphia, PA, USA.

i6

HYDROSTATIC INTRALUMINAL ESOPHAGEAL STRETCH: PROTOTYPE FABRICATION AND INITIAL SAFETY TESTING IN A LARGE ANIMAL MODEL

Christopher D. Graham, MD[1], Hester F. Shieh, MD[1], Mustafa Karabas, MS[2], David Zurakowski, PhD[1], Anne Hansen, MD, MPH[1], Dario O. Fauza, MD, PhD[1].

[1]Boston Children's Hospital, Boston, MA, USA, [2]Wyss Institute for Biologically Inspired Engineering at Harvard University, Boston, MA, USA.

i7

NEONATAL ESOPHAGEAL TRACHEALIZATION AND ESOPHAGOCARINOPLASTY IN THE TREATMENT OF FLOW LIMITED FLOYD II TRACHEAL AGENESIS

Ruchi A. Amin, MD[1], Keith T. Oldham, MD[1], Kathleen M. Dominguez, MD[2], Elizabeth R. Berdan, MD[1], Michael E. McCormick, MD[1], David J. Beste, MD[1], Louella B. Amos, MD[1], Cecilia A. Lang, APNP[1], Ronald K. Woods, MD[1], Peter C. Kouretas, MD[1], Michael E. Mitchell, MD[1], John C. Densmore, MD[1].

[1]Children's Hospital of Wisconsin, Milwaukee, WI, USA, [2]Marshfield Clinic, Marshfield, WI, USA.

8:00 a.m. – 10:00 a.m.	Companion Hospitality Suite Open	*33rd Floor Lounge*
9:00 a.m. – 9:45 a.m.	Refreshment Break	*Great Hall 3, 3rd Fl.*

Program in Detail (cont.)

Robert E. Gross Lecture

Out of Africa: Insights from a Prospective Pediatric Surgery Database

9:45 a.m. – 10:30 a.m. *Great Hall 4, 3rd Fl.*

Stephen W. Bickler, MD, DTM&H
Professor of Surgery and Pediatrics, Rady Children's Hospital - University of California, San Diego CA USA

Learning Objectives

By the end of the presentation, attendees will be able to:

- Recognize the importance of formulating a research question that is based on clinical observations
- Describe the major gaps that exist in the surgical care of children worldwide and the important role research can have in improving care
- Recognize the complex interactions that exist between childhood undernutrition and immunity, and their potential role in the global epidemic of non-communicable diseases.

10:00 a.m.	Exhibitor Dismantle	*Great Hall 3, 3rd Fl.*
10:00 a.m.	Poster Presenter Dismantle	*Great Hall 3, 3rd Fl.*
10:00 a.m.	Simulation Learning Center Dismantle	*Great Hall 3, 3rd Fl.*

Plenary Session II

10:30 a.m. – 11:30 a.m. *Great Hall 4, 3rd Fl.*

Moderators: David A. Rodeberg, MD; Diana L. Farmer, MD

50

STEM CELL ENGRAFTMENT IN THE PROPHYLACTIC TREATMENT OF EXPERIMENTAL NECROTIZING ENTEROCOLITIS

Christopher J. McCulloh, MD, Jacob K. Olson, MD, Yijie Wang, MS, Yu Zhou, MD, Gail E. Besner, MD.

Nationwide Children's Hospital, Columbus, OH, USA.

51

ARE ESOPHAGOCRURAL SUTURES NECESSARY DURING A LAPAROSCOPIC FUNDOPLICATION: A PROSPECTIVE RANDOMIZED TRIAL

Shawn D. St.Peter, MD, Ashwini S. Poola, MD, Obinna O. Adibe, MD, David Juang, MD, Jason D. Fraser, MD, Pablo Aguayo, MD, Charles L. Snyder, MD, **George W. Holcomb, MD**.

Children's Mercy Hospital, Kansas City, MO, USA.

52

FEEDING ADVANCEMENT AND SIMULTANEOUS TRANSITION TO DISCHARGE (FAST-DISCHARGE) CLINICAL PATHWAY

Ashwini S. Poola, MD, Tolulope A. Oyentunji, MD, MPH, Katrina L. Weaver, MD, Rebecca M. Rentea, MD, Shawn D. St.Peter, MD, Richard J. Hendrickson, MD.

Children's Mercy Hospital, Kansas City, MO, USA.

Program in Detail (cont.)

Saturday, May 6 (cont.)

53

OUTCOMES FOLLOWING ELECTIVE RESECTION OF CONGENITAL PULMONARY AIRWAY MALFORMATIONS IS EQUIVALENT AFTER 3 MONTHS OF AGE AND A WEIGHT OF FIVE KILLOGRAMS

Brian C. Gulack, MD, MHS, Harold L. Leraas, BS, Brian Ezekian, MD, Jina Kim, MD, Christopher Reed, MD, Obinna O. Adibe, MD, Henry E. Rice, MD, Elisabeth T. Tracy, MD.

Duke University, Durham, NC, USA.

54

PRE-ACTIVATION OF INVARIANT NATURAL KILLER T CELLS REDUCES INFLAMMATION AND IMPROVES SURVIVAL IN MURINE NEONATAL SEPSIS

Alexandra C. Bolognese, MD[1], Weng-Lang Yang, PhD[2], Laura W. Hansen, MD[3], Archna Sharma, PhD[2], Jose M. Prince, MD[3], Jeffrey M. Nicastro, MD[3], Gene F. Coppa, MD[3], Ping Wang, MD[2].

[1]Elmezzi Graduate School of Molecular Medicine, Manhasset, NY, USA, [2]The Feinstein Institute for Medical Research, Manhasset, NY, USA, [3]Hofstra Northwell School of Medicine, Manhasset, NY, USA.

55

SURGICAL APPROACH AND TRANSANASTAMOTIC TUBES IN THE REPAIR OF TRACHEOESOPHAGEAL FISTULAE

Joseph C. Fusco, MD, Juan L. Calisto, MD, Marcus M. Malek, MD.

Children's Hospital of Pittsburgh of UPMC, Pittsburgh, PA, USA.

56

ERYTHROPOIETIN PREVENTS ANEMIA AND THE NEED FOR TRANSFUSION IN PREMATURE LAMBS SUPPORTED BY AN EXTRACORPOREAL ENVIRONMENT FOR NEONATAL DEVELOPMENT

Ali Y. Mejaddam, MD, Matthew A. Hornick, MD, Patrick E. McGovern, MD, Grace Hwang, BS, Kathleen Young, BS, Kendall M. Lawrence, MD, Heron D. Baumgarten, MD, Avery C. Rossidis, MD, Emily A. Partridge, MD, PhD, William H. Peranteau, MD, Marcus G. Davey, PhD, Alan W. Flake, MD.

Children's Hospital of Philadelphia, Philadelphia, PA, USA.

Jay and Margie Grosfeld Lecture

A Model for Humanitarian Outreach in Today's World

11:30 a.m. – 12:15 p.m. *Great Hall 4, 3rd Fl.*

James A. O'Neill, Jr., MD
Fushee Distinguished Professor and Chairman Emeritus, Section of Surgical Science, Vanderbilt University School of Medicine and Medical Center, Nashville, TN USA

Learning Objectives
By the end of the presentation, attendees will be able to:

- Describe the UN Millennium Goals and The Lancet Commission Report, Surgery 2030 on Global Health

Program in Detail (cont.)

- Communicate how health efforts promote economic development and amelioration of poverty
- Recognize the magnitude of how many people in Africa lack safe surgery and anesthesia, the extreme deficit in a capable physician workforce and suggestions on how to make an impact on this

12:15 p.m. – 1:00 p.m. Box Lunch Pick-up *Great Hall 4 Foyer, 3rd Fl.*

Travel Fellow Presentations

1:00 p.m. – 1:30 p.m. *Great Hall 4, 3rd Fl.*

Martin Situma, MD, Mbarara University of Science & Technology, Mbarara, Uganda
Development of a Pediatric Surgical Unit in a Resource-Constrained Setting in Western Uganda

Sushil Dhungel, MD, Western Regional Hospital, Pokhara, Nepal
Pediatric Surgical Specialty in Nepal: Then and Now

New Member Induction Ceremony

1:30 – 1:45 p.m. *Great Hall 4, 3rd Fl.*

Scientific Session V: Oncology

2:00 p.m. – 3:00 p.m. *Great Hall 4, 3rd Fl.*

Moderators: Jennifer H. Aldrink, MD; Daniel von Allmen, MD

57

LIVER TRANSPLANTATION FOR PRIMARY HEPATIC MALIGNANCIES OF CHILDHOOD: THE UNOS EXPERIENCE

Julius Balogh, MD, MHA[1], Duc T. Nguyen, MD, PhD[1], Edward A. Graviss, PhD, MPH[1], **Emma C. Hamilton, MD**[2], Andras A. Heczey, MD[3], Mary T. Austin, MD, MPH[4].

[1]Houston Methodist Hospital, Houston, TX, USA, [2]McGovern Medical School, Houston, TX, USA, [3]Baylor College of Medicine, Houston, TX, USA, [4]University of Texas MD Anderson Cancer Center, Houston, TX, USA.

58

SUSTAINED INHIBITION OF TUMOR GROWTH BY COMBINED HIGH DOSE RADIATION AND CHECKPOINT BLOCKADE IN A SYNGENEIC MOUSE MODEL OF HIGH RISK NEUROBLASTOMA

Shunpei Okochi, MD, Cherease Street, BS, Sunjay M. Barton, BS, Debarshi Banerjee, PhD, Robyn D. Gartrell, MD, Yan Lu, MD, Darrell J. Yamashiro, MD, PhD, Eileen P. Connolly, MD, PhD, Angela Kadenhe-Chiweshe, MD.

Columbia University Medical Center, New York, NY, USA.

Program in Detail (cont.)

Saturday, May 6 (cont.)

59

USE OF INTRAOPERATIVE NUCLEAR IMAGING LEADS TO DECREASED ANESTHESIA TIME AND REAL-TIME CONFIRMATION OF LESION REMOVAL

Joseph C. Fusco, MD, Michael Czachowski, MBA, Alexander Davit III, MD, Judith Joyce, MD, Kevin Mollen, MD, Stefan Scholz, MD, Lorelei Grunwaldt, MD, Barbara Gaines, MD, Marcus Malek, MD.

Children's Hospital of Pittsburgh of UPMC, Pittsburgh, PA, USA.

60

NODAL STAGING GUIDELINES FOR ADULT MELANOMA MAY NOT APPLY TO CHILDREN

Jina Kim, MD, Zhifei Sun, MD, Brian R. Englum, MD, Brian Ezekian, MD, Christopher R. Reed, MD, Harold J. Leraas, BS, Neel Nath, BS, Paul J. Mosca, MD, PhD, Elisabeth T. Tracy, MD.

Duke University Medical Center, Durham, NC, USA.

61

EPIDERMAL GROWTH FACTOR RECEPTOR (EGFR) INHIBITION DECREASES METASTASIS IN A MURINE MODEL OF OSTEOSARCOMA

Caroline Maloney, MD[1], Morris Edelman[2], Marc Symons, PhD[1,3], Bettie M. Steinberg PhD [1,3] , Samuel Z. Soffer, MD [3,4].

[1]The Elmezzi Graduate School of Molecular Medicine, Northwell Health, Manhasset, New York, USA, [2]Department of Pediatric Pathology, Cohen Children's Medical Center, Northwell Health, New Hyde Park, New York, USA, [3]Center for Oncology and Cell Biology, The Feinstein Institute for Medical Research, Northwell Health, Manhasset, New York, USA, [4]Department of Pediatric Surgery, Cohen Children's Medical Center, Northwell Health, New Hyde Park, New York, USA.

62

IMAGE BASED SURGICAL GUIDELINES ARE ASSOCIATED WITH INCREASED CURATIVE SURGICAL RESECTION IN HEPATOBLASTOMA: A REPORT FROM THE CHILDREN'S ONCOLOGY GROUP AHEP-0731 TRIAL

Rebecka L. Meyers, MD[1], Gregory M. Tiao, MD[2], Max R. Langham, Jr., MD[3], Eugene D. McGahren, MD[4], Stephen P. Dunn, MD[5], Christopher B. Weldon, MD, PhD[6], Marcio H. Malogolowkin, MD[7], Wayne L. Furman, MD[8], Mary Beth McCarville, MD[8], Alex J. Towbin, MD[2], Milton J. Finegold, MD[9], Sarangarajan Ranganathan, MD[10], Mark Krailo, PhD[11], Howard M. Katzenstein, MD[12].

[1]University of Utah, Primary Children's Hospital, Salt Lake City, UT, USA, [2]Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA, [3]University of Tennessee, Memphis, TN, USA, [4]University of Virginia Health System, Charlottesville, VA, USA, [5]Al DuPont Hospital for Children, Wilmington, DE, USA, [6]Children's Hospital Boston, Boston, MA, USA, [7]University of California, Davis, Sacramento, CA, USA, [8]St. Jude Children's Research Hospital, Memphis, TN, USA, [9]Baylor College of Medicine, Houston, TX, USA, [10]Children's Hospital of Pittsburgh, Pittsburgh, PA, USA, [11]Children's Oncology Group, Monrovia, CA, USA, [12]Vanderbilt University Medical Center, Children's Hospital, Nashville, TN, USA.

Program in Detail (cont.)

63

THE IN VITRO AND IN VIVO EFFICACY OF ACTIVATED NATURAL KILLER CELLS COMBINED WITH ANTI-GD2 ANTIBODY IN NEUROBLASTOMA

Wesley E. Barry, MD, Jeremy R. Jackson, MD, Grace Asuelime, MA, Hong-wei Wu, MD, Jianping Sun, PhD, Larry Wang, MD, PhD, Robert C. Seeger, MD, Eugene S. Kim, MD.

Children's Hospital Los Angeles, Los Angeles, CA, USA.

Video Session

3:00 p.m. – 4:00 p.m. *Great Hall 4, 3rd Fl.*

Moderators: Peter S. Midulla, MD; Catherine C. Chen, MD

V1

INDOCYANINE GREEN FLUOROESCENCE CHOLANGIOGRAPHY DURING LAPAROSCOPIC CHOLECYSTECTOMY

Claire Graves, MD[1], Olajire Idowu, MD[2], Christopher R. Newton, MD[2], Sunghoon Kim, MD[2].

[1]UCSF Benioff Children's Hospital, San Francisco, CA, USA, [2]UCSF Benioff Children's Hospital, Oakland, CA, USA.

V2

LAPAROSCOPIC RESECTION OF BILATERAL OVARIAN CYSTIC TERATOMAS WITH OVARIAN SPARING SURGERY

Lorraine I. Kelley-Quon, MD, MSHS, Carlos Reck, MD, Geri D. Hewitt, MD, Jennifer H. Aldrink, MD.

Nationwide Children's Hospital, Columbus, OH, USA.

V3

ROBOTIC LONGITUDINAL PANCREATICOJEJUNOSTOMY (PEUSTOW) FOR CHRONIC PANCREATITIS IN AN ADOLESCENT

Anna F. Tyson, MD, MPH, Daniel A. Bambini, MD, John B. Martinie, MD.

Carolinas Medical Center, Charlotte, NC, USA.

V4

PENTALOGY OF CANTRELL WITH A LEFT VENTRICULAR DIVERTICULUM - A ONE-STAGE REPAIR OF A COMPLEX THORACOABDOMINAL DEFECT

Alfred F. Trappey, III, MD, Shinjiro Hirose, MD, Gary Raff, MD, Jacob T. Stephenson, MD.

University of California, Davis, Sacramento, CA, USA.

V5

RIGHT-SIDED THORACOSCOPIC REPAIR OF ESOPHAGEAL ATRESIA WITH DISTAL TRACHEOESOPHAGEAL FISTULA IN A 2KG INFANT WITH A RIGHT-SIDED AORTIC ARCH

Tolulope A. Oyetunji, MBChB[1], **Jason D. Fraser, MD**[2].

[1]Ann & Robert H. Lurie Children's Hospital, Chicago, IL, USA, [2]Children's Mercy Hospital, Kansas City, MO, USA.

Program in Detail (cont.)

Saturday, May 6 (cont.)

V6

THORACOSCOPIC REPAIR OF A LONG GAP ESOPHAGEAL ATRESIA WITH PROXIMAL FISTULA

Steven S. Rothenberg, MD, Bethany J. Slater, MD.

The Rocky Mountain Hospital for Children, Denver, CO, USA.

V7

A TECHNIQUE TO PREVENT BAR DISPLACEMENT IN THE NUSS PROCEDURE

Claire E. Graves, MD[1], Andrew Phelps, MD[1], Olajire Idowu, Jr., MD[2], Sunghoon Kim, MD[2], Benjamin E. Padilla, MD[1].

[1]*University of California, San Francisco Benioff Children's Hospital, San Francisco, CA, USA,* [2]*University of California, San Francisco Benioff Children's Hospital, Oakland, CA, USA.*

4:00 p.m. – 6:00 p.m.	Pediatric Surgery NaT Reception (by invitation)	*Room 307, N, 3rd Fl.*
6:30 p.m. – 7:00 p.m.	President's Reception	*South Palm Court, Lobby Level*
7:00 p.m. – 10:00 p.m.	President's Banquet	*Great Hall 4, 3rd Fl.*

Program in Detail (cont.)

Sunday, May 7

6:00 a.m. – 8:00 a.m.	Committee Meetings (see page 61 for Ancillary Meeting Schedule)	
6:30 a.m. – 8:00 a.m.	Continental Breakfast	*Great Hall Foyer, 3rd Fl.*
7:30 a.m. – 11:00 a.m.	Registration Open	*Great Hall 4 Foyer, 3rd Fl.*
7:30 a.m. – 11:00 a.m.	Speaker Ready Room Open	*Great Hall Registration Desk, 3rd Fl.*
7:30 a.m. – 11:00 a.m.	Internet Café Open/Twitter Fall	*Great Hall 4 Foyer, 3rd Fl.*

COG Update

8:00 a.m. – 9:00 a.m. *Great Hall 4, 3rd Fl.*

Moderators: Rebecka L. Meyers, MD; Max R. Langham, Jr., MD

COG Current Studies Update

Learning Objectives:

By the end of the presentation, attendees will be able to:

- Name the primary results and study characteristics of open and recently closed COG solid tumor multicenter trials

Neuroblastoma

Mary Beth Madonna, MD

Wilms Tumor

Jennifer H. Aldrink, MD

Sarcoma and Bone

Roshni A. Dasgupta, MD

Liver Tumors, Germ Cell, Adrenocortical Carcinoma

Sanjeev A. Vasudevan, MD

Pros and Cons of Thoracoscopic vs Open Resection Sarcoma Lung Metastases

Learning Objectives:

By the end of the presentation, attendees will be able to:

- Identify the pros and cons of thoracoscopic vs open resection of sarcoma lung metastases
- Assess the results of an APSA survey on thorascopic vs open resection of osteosarcoma lung metastases

Program in Detail (cont.)

Sunday, May 7 (cont.)

Data from Memorial Sloan Kettering
Todd E. Heaton, MD

Increasing Use of Thoracoscopy in Adults
Wendy Su, MD

APSA Membership Survey Results and COG Study Concept
John J. Doski, MD

Town Hall Meeting
9:00 a.m. – 11:00 a.m. *Great Hall 4, 3rd Fl.*

Annual Meeting concludes.

Poster Session 1

Poster Session I: Basic Science
Thursday, May 4, 4:30 – 6:15 p.m.

P1

HEPARIN IMPAIRS COMPENSATORY LUNG GROWTH BY REDUCING THE ACTIVATION OF THE VASCULAR ENDOTHELIAL GROWTH FACTOR RECEPTOR

Duy T. Dao, MD, Jared Ourieff, MS, Lorenzo Anez-Bustillos, MD, Amy Pan, BA, Hiroko Kishikawa, PhD, Paul D. Mitchell, MSc, Meredith A. Baker, MD, Gillian L. Fell, MD, PhD, Hong Chen, PhD, Michael S. Rogers, PhD, Randolph Watnick, PhD, Diane R. Bielenberg, PhD, Mark Puder, MD, PhD.

Boston Children's Hospital, Boston, MA, USA.

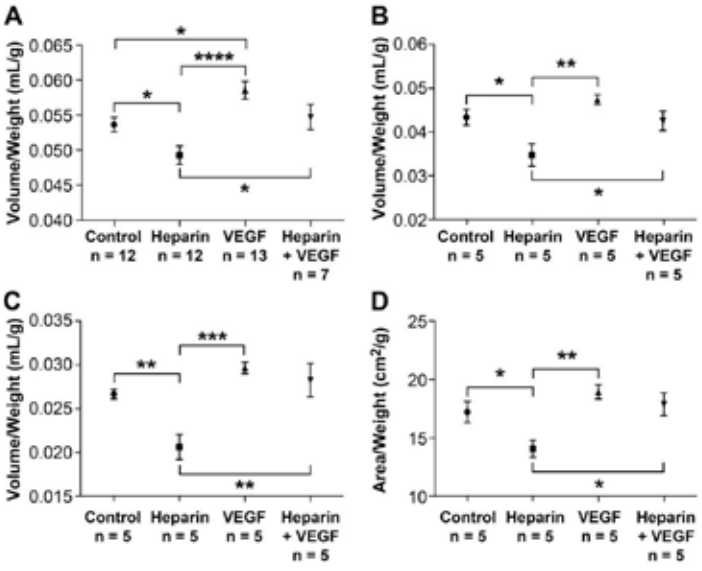
Purpose: Exogenous VEGF accelerates compensatory lung growth (CLG), and therefore may benefit children with pulmonary hypoplasia associated with congenital diaphragmatic hernia (CDH). Many of these children require extracorporeal membrane oxygenation and systemic heparinization. This study aims to investigate the effects of heparin on VEGF-mediated CLG.

Methods: Eight-week old C57Bl/6 male mice underwent left pneumonectomy and were randomized into four experimental groups. The control group received 100 microliters of normal saline intraperitoneally (IP). The heparin group received 500 units/kg of IP heparin every 12 hours for the first 48 hours followed by every 24 hours. The VEGF group received daily IP injection of VEGF at a dose of 0.5 mg/kg. The heparin+VEGF group received IP heparin and VEGF at the aforementioned dosing regimens. Mice were euthanized on post-operative day (POD) 4; lung volume was determined by the water displacement method. Morphometric analyses were performed utilizing a point-counting technique. Lung protein expression level was analyzed with Western Blot of tissue homogenate.

Results: Lung volume-to-body weight ratio on POD 4 was lower in the heparin group compared to the control, VEGF, and heparin+VEGF groups (0.049±0.001 vs. 0.054±0.001 (P=0.04), 0.059±0.001 (P<0.0001), and 0.055±0.002 (P=0.04) mL/g, respectively). Compared to the control, VEGF, and heparin+VEGF groups, mice in the heparin group had lower alveolar volume (0.021±0.001 vs. 0.027±0.001 (P=0.01), 0.030±0.001 (P=0.0006), and 0.028±0.001 (P=0.003) mL/g, respectively) and septal surface area (14.1±0.7 vs. 17.2±0.9 (P=0.05), 19.0±0.6 (P=0.004), and 17.9±1.0 (P=0.02) cm^2/g, respectively). Heparin mice had a lower level of pulmonary phosphorylated VEGF receptor 2 (VEGFR2) compared to the control group (P=0.03).

Conclusions: Heparin impaired VEGF-mediated CLG and significantly decreased both alveolar volume and septal surface area. This could be a result of reduced VEGFR2 activation. These findings raise concern for adverse effects of heparin on lung growth in children with CDH who require systemic heparinization.

Poster Session 1 (cont.)



Panels comparing (A) total lung volume/body weight, (B) parenchymal volume/body weight, (C) alveolar volume/body weight, and (D) septal surface area/body weight among the four experimental groups.
* $P \leq 0.05$, ** $P \leq 0.01$, *** $P \leq 0.001$, **** $P \leq 0.0001$

Poster Session 1 (cont.)

P2

FETAL SURGICAL REPAIR OF MYELOMENINGOCELE USING A BIOENGINEERED EXTRACELLULAR MATRIX PATCH IN A RODENT MODEL: A FEASIBILITY STUDY

Y. Julia Chen, MD, Christopher Pivetti, MA, Sandra Kabagambe, MD, Karen Chung, BS, Zoe Saenz, BS, Lee Lankford, MA, Melissa Vanover, MD, Aijun Wang, PhD, Diana L. Farmer, MD.

University of California Davis Medical Center, Sacramento, CA, USA.

Purpose: This study describes the *in-utero* surgical repair of myelomeningocele (MMC) with human placenta derived mesenchymal cells (PMSCs) seeded on an extracellular matrix (ECM) in a retinoic acid (RA) induced model of rodent MMC.

Methods: Time mated female Sprague Dawley rodents are treated with RA on embryonic age (EA) 10. Survival fetal surgical repair of MMC is performed on EA19. A hysterotomy is made exposing the lumbosacral portion of the fetus and MMC defect. Using microsurgical techniques, a 6-millimeter diameter disc of ECM seeded with PMSCs labeled with green fluorescent protein (GFP) is sutured to the fetus in order to cover the MMC defect (Figure A, B). Amniotic fluid is replaced with normal saline and the hysterotomy is closed. Dams are treated with cyclosporine for postoperative immunosuppression. Pups are collected via terminal caesarean section on EA 21 for histological analysis.

Results: 41 Sprague Dawley dams were treated with 40 mg/kg of RA resulting in 506 total pups. 138 pups had RA induced fetal demise and 367 were viable at the time of the initial survival surgery with a fetal viability rate of 72.5%. 214 (58.3%) presented with MMC defects. 31.6% (116/367) had anencephaly. 76 pups underwent MMC repair and 65 (85.5%) survived to the time of delivery. Fluorescent microscopy of the ECM demonstrated the presence of PMSCs retained on the ECM at time of fetal collection (Figure C, D).

Conclusion: Surgical repair of MMC with a PMSC seeded ECM disc is feasible with a postoperative fetal rodent survival rate of 85.5%. Maternal cyclosporine treatment facilitates xerographic PMSC retention in this model of MMC repair as PMSCs can be visualized on ECM post delivery.

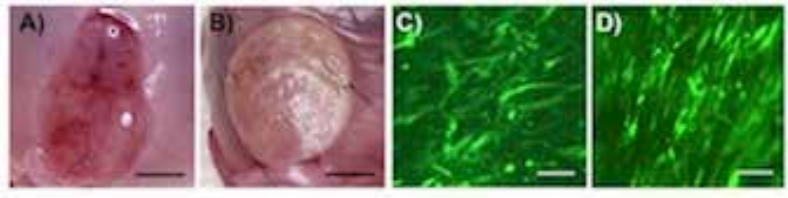


Figure: MMC defect pre-repair (scale = 2mm) (A), post-repair (B), PMSCs on ECM (scale = 100 μm) pre-repair (C), post-repair (D).

Poster Session 1 (cont.)

P3

ESOPHAGEAL SCAFFOLDS SEEDED WITH EPITHELIAL CELLS FOR ESOPHAGEAL REPLACEMENT THERAPY

Todd Jensen, MHS[1], Christine M. Finck, MD[2], Wael Sayej, MD[2].

[1]University of Connecticut Health Center, Farmington, CT, USA, [2]Connecticut Children's Medical Center, Hartford, CT, USA.

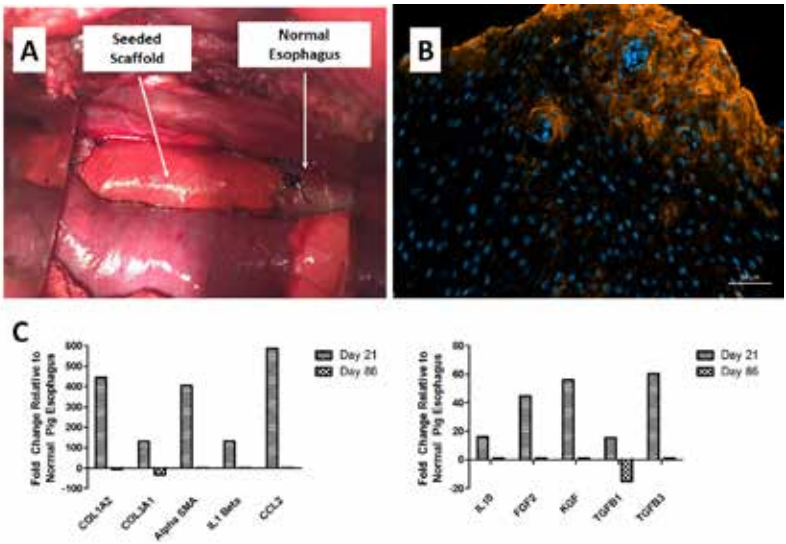
Purpose: Esophageal atresia occurs in 1 in 3000 births. Typically, surgical repair includes re-connection of the esophagus or in cases where the esophagus cannot be reconnected, interposition of a piece of stomach or intestine. These surgical options have significant morbidity, therefore, a novel therapeutic option is needed.

Methods: Porcine esophageal epithelial cells were obtained by dissociating esophageal biopsies of normal esophageal mucosa. Cells were allowed to expand for 7-10 days and then were seeded into the lumen of synthetic scaffolds (Biostage) and incubated for 7 days. A 5-8cm section of the thoracic region of the esophagus of a Yukatan pig was removed and replaced with this seeded scaffold. The scaffold was sutured into place and stented. Controls were unseeded scaffolds. Esophageal biopsies were sequentially obtained at different stages of healing and were analyzed via immunofluorescence and qRT-PCR.

Results*:* Initial esophageal biopsies stained positive for pan cytokeratin as well as proliferation marker KI-67. A wound healing qRT-PCR array was used to compare inflammatory and regenerative signals at Day 21 and Day 86. This data demonstrates an upregulation in pro-inflammatory genes IL1β and CCL2 at day 21, but expression that is similar to normal esophagus by day 86. Furthermore, there is a dramatic up-regulation of collagen I, collagen III and alpha smooth muscle actin at day 21, with gene expression being restored to normal by day 86. Growth factors TGFB1, KGF and FGF2 were also up-regulated at day 21, but were restored to near normal levels by day 86.

Conclusion: This approach to implanting esophageal scaffolds seeded with autologous epithelial cells demonstrates regeneration over a period of several weeks. The response seen at the tissue level indicates a phased wound healing response- first with inflammation then with regeneration. Continued exploration of the repair mechanisms using this strategy is underway.

Poster Session 1 (cont.)



A. Seeded Scaffold Implanted into the thorasic Region of the Normal Esophagus of a Yukatan Mini-Pig
B. Day 21 biopsy located at the anastomosis stained for pan cytokeratin
C. Gene Expression Analysis of tissue obtained at Day 21 vs day 86

Poster Session 1 (cont.)

P4

FETAL REPAIR WITH PLACENTAL DERIVED MESENCHYMAL STROMAL CELL ENGINEERED PATCH LIMITS SPINAL CORD DAMAGE IN RODENT MODEL OF MYELOMENINGOCELE

Y. Julia Chen, MD, Christopher Pivetti, MA, Sandra Kabagambe, MD, Karen Chung, BS, Chelsey Lee, BA, Lee Lankford, MA, Melissa Vanover, MD, Aijun Wang, MD, Diana L. Farmer, MD.

University of California Davis Medical Center, Sacramento, CA, USA.

Tweet about it: Novel cell engineered patch limits spinal cord damage in rodent myelomeningocele model!

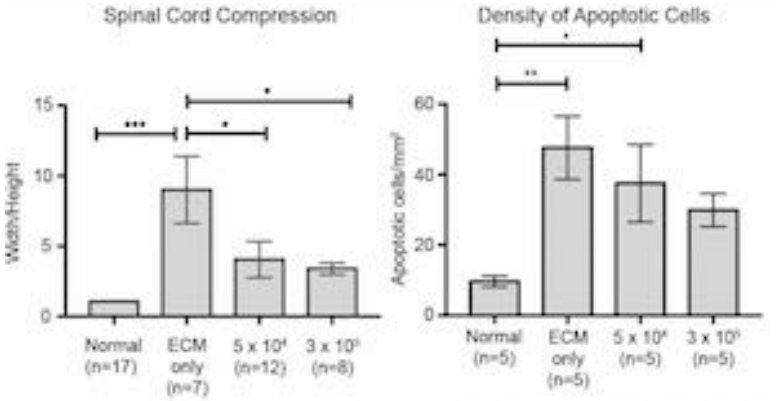
Purpose: This study characterizes changes in spinal cord tissue in a rodent model of fetal repair of myelomeningocele (MMC) treated with a placenta derived mesenchymal stromal cell (PMSC) extracellular matrix (ECM) patch.

Methods: Human PMSCs were seeded onto ECM at two densities (cells/cm^2): low ($5x10^4$) and high ($3x10^5$). Retinoic acid treated Sprague-Dawley rodents underwent fetal repair of MMC on embryonic age (EA) 19. Treatment groups included: ECM-only, low-density PMSC-ECM and high-density PMSC-ECM. Pups without MMC served as controls. Terminal Caesarean section was performed on EA21 on 65 pups. Histological samples from 44 total pups were analyzed; 17 normal, 7 ECM-only, 12 low-density PMSC-ECM, 8 high-density PMSC-ECM. The cross sectional height, width, and area of histological sections of the lumbosacral spinal cord were measured using Image-J. Spinal cord compression (width/height) was calculated to assess degree of cord deformity. Density of apoptotic cells was evaluated using TUNEL staining (n=5/group). Statistical significance was determined using One-Way ANOVAs with multiple comparisons.

Results: There was no significant difference in mean cord area between groups. The mean width/height ratio in normal animals was 1.066 ± 0.032. The ECM-only group had a significantly greater compression than the normal ($p<0.0001$), low-density PMSC-ECM ($p=0.0203$) and high-density PMSC-ECM ($p=0.0147$) groups. There was no significant difference between cell treated groups and the normal group. The density of apoptotic cells was significantly greater in the ECM-only ($p=0.0083$) and the low-density groups ($p=0.0391$) than the normal group. There was no significant difference between the high-density and the normal group. There was a trend of decreasing apoptotic cell density with increased PMSC seeding density.

Conclusion: Fetal rodents repaired with PMSC-ECM patches have significantly less cord deformity and decreased histological evidence of apoptosis compared to ECM-only controls. The spinal cords of rodents treated with high-density cells have morphological and histological characteristics that are not significantly different from normal rodents.

Poster Session 1 (cont.)



Poster Session 1 (cont.)

P5

PATIENT REPORTED LONG-TERM OUTCOMES IN CHILDREN WITH GASTROSCHISIS

Hope E. Arnold, BS[1], **Katherine J. Baxter, MD, MS**[1], Heather L. Short, MD[1], Curtis Travers, MPH[2], Amina M. Bhatia, MD, MS[1], Megan M. Durham, MD[1], Mehul V. Raval, MD, MS[1].

[1]Division of Pediatric Surgery, Department of Surgery, Emory University School of Medicine, Children's Healthcare of Atlanta, Atlanta, GA, USA, [2]Division of Pediatrics, Emory University School of Medicine, Atlanta, GA, USA.

Tweet about it: Children born with gastroschisis have overall reassuring quality of life scores and surgical outcomes at long-term follow up. -APSA 2017

Purpose: The goal of this study is to determine long-term outcomes for patients with gastroschisis including quality of life measures, surgical reoperation rates, and residual gastrointestinal symptom burden.

Methods: Retrospective chart review of patients who underwent surgical repair of gastroschisis between January 1, 2009 and December 31, 2012 was performed at a quaternary children's hospital. Phone surveys of parents were conducted using two validated surveys (PedsQL Pediatric Quality of Life Inventory/PedsQL Gastrointestinal Symptoms Module). We collected additional outcome data including subsequent operations and current health status. Descriptive statistics were compared using chi-square and Wilcoxon Rank-Sum tests.

Results: Of 143 gastroschisis patients identified, 52 families (36.3%) were reached with 45 (87%) agreeing to participate. The median age at follow-up was 4.7 years. Eight (17.7%) had complex gastroschisis. Twelve (26.7%) were closed primarily and 33 (73.3%) were silo closures (mean closure 7 days). Despite differences in short-term outcomes such as longer length of stay for patients with complex gastroschisis, there were no major differences in long-term outcomes when patients were stratified by birthweight, complexity of gastroschisis, or closure timing (Table). Children with complicated gastroschisis experienced abdominal pain/gas/diarrhea more often than those with simple gastroschisis. Five (11.1%) children needed additional surgery after definitive closure and establishment of intestinal continuity. There were no explorations for lysis of adhesions or bowel obstructions identified, and though 10 (22.5%) of children had umbilical hernias, none had undergone repairs at the time of follow-up.

Conclusions: Although patients with complicated gastroschisis were more likely to experience certain gastrointestinal symptoms, overall quality of life scores and surgical outcomes were reassuring for children with gastroschisis.

Poster Session 1 (cont.)

Short and long-term outcomes for children with gastroschisis (bold p<0.05 between groups)

	Primary Closure (N = 12)	Delayed Closure (N = 33)	Simple Gastroschisis (N = 37)	Complex Gastroschisis (N = 8)	< 2400 g Birthweight (N = 21)	≥ 2400 g Birthweight (N = 24)
Length of stay (days)	22 (20, 27)	37 (27, 46)	29 (23, 40)	85 (61, 126)	40 (26, 50)	30 (23, 41)
Days of life to full feeds	18 (15, 20)	30 (25, 39)	27 (20, 31)	58 (37, 69)	31 (20, 39)	27 (20, 30)
Umbilical hernia	3 (25.0%)	7 (21.1%)	9 (24.3%)	1 (12.5%)	7 (33.3%)	3 (12.5%)
Subsequent surgery	3 (25.0%)	2 (6.1%)	4 (10.8%)	1 (12.5%)	1 (4.8%)	4 (16.7%)
Overall PedsQL	98.4 (95.0, 100)	100 (95.7, 100)	100 (95.7, 100)	98.9 (94.5, 100)	100 (94.6, 100)	98.9 (95.7, 100)
Overall PedsQL GI	95.4 (84.1, 100)	95.9 (88.9, 100)	96.6 (93.2, 100)	85.5 (79.7, 98.6)	95.3 (82.4, 100)	96.6 (91.2, 100)
Abdominal Pain	100 (83.3, 100)	100 (58.3, 100)	100 (87.5, 100)	100 (47.9, 100)	100 (58.3, 100)	100 (62.5, 100)
Diarrhea	100 (100, 100)	100 (78.6, 100)	100 (100, 100)	66.1 (55.4, 85.7)	100 (64.3, 100)	100 (100, 100)
Gas and bloating	100 (64.3, 100)	100 (64.3, 100)	100 (100, 100)	58.9 (50, 100)	100 (50, 100)	100 (85.7, 100)

Poster Session 1 (cont.)

P6

REGENERATION OF FUNCTIONAL INTESTINAL EPITHELIUM USING HUMAN INDUCED PLURIPOTENT STEM CELLS ON A DECELLULARIZED MATRIX PLATFORM

Dana M. Schwartz, MD[1], Kentaro Kitano, MD[1], Haiyang Zhou, MD[2], Xi Ren, PhD[2], Allan M. Goldstein, MD[1], Harald C. Ott, MD[1].

[1]Massachusetts General Hospital, Department of Surgery, Boston, MA, USA,
[2]Massachusetts General Hospital, Center for Regenerative Medicine, Boston, MA, USA.

Purpose: A transplantable intestinal graft constructed entirely from autologous cells would be a novel treatment option for patients with short bowel syndrome. We aimed to develop patient-specific small bowel on a platform of decellularized matrix, with epithelium derived from induced pluripotent stem cells (iPSCs) and vasculature comprised of human endothelium.

Methods: Intestinal extracellular matrix scaffolds were generated using perfusion decellularization of whole rat jejunal segments (Figure 1a-d). Human iPSCs were differentiated into intestinal spheroids, and seeded to the luminal surface of scaffolds (n=6). Human umbilical vein endothelial cells were seeded through the superior mesenteric artery and vein. After 2.5 weeks of culture, three recellularized scaffolds were processed for immunohistochemistry while the remaining three were placed in an isolated perfusion construct to evaluate absorptive function. With Krebs-Henseleit solution as a vascular perfusate, glucose (25mM) was delivered at a constant rate to the lumen. Transfer of glucose from the lumen into the venous effluent was measured in regenerated bowel (n=3) and compared with both fresh cadaveric bowel (n=3) and decellularized scaffolds (n=3). Statistical significance was calculated using ANOVA, with $p<0.05$ as a cut off.

Results: Engrafted intestinal spheroids formed a polarized epithelial monolayer covering more than 80% of the luminal surface of the scaffolds (Figure 1e). Immunohistochemistry confirmed differentiation of enterocytes (villin), Paneth cells (lysozyme), and enteroendocrine cells (chromogranin A), as well as the presence of digestive brush border enzymes (sucrase-isomaltase and maltase). Recellularized bowel had significantly increased vascular throughput above that of decellularized scaffolds (0.85 vs. 0.16 µl/min/mg tissue, p=0.02). Cadaveric bowel demonstrated a glucose transfer rate of 9.06 nmol/cm gut/min (Figure 1f). Additionally, regenerated bowel showed a trend toward restored glucose transfer in comparison with decellularized scaffolds, (4.91 vs. 1.42 nmol/min/mg, p=0.11).

Conclusion: We conclude that decellularized organ scaffolds repopulated with iPSC-derived epithelium and human endothelium demonstrate improved perfusion and partial restoration of glucose absorption.

Poster Session 1 (cont.)

P7

OMEGA-3 FATTY ACID CAN PREVENT THE DEVELOPMENT OF NECROTIZING ENTEROCOLITIS IN NEONATAL MICE

Hiromu Miyake, MD[1], Kathryn Hopperton, PhD[2], Yuhki Koike, MD[1], Yong Chen, MD[1], Bo Li, PhD[1], Carol Lee, MSc[1], Alison Hock, BSc[1], Richard Bazinet, PhD[2], Agostino Pierro, MD[1].

[1]The Hospital for Sick Children, Toronto, ON, Canada, [2]University of Toronto, Toronto, ON, Canada.

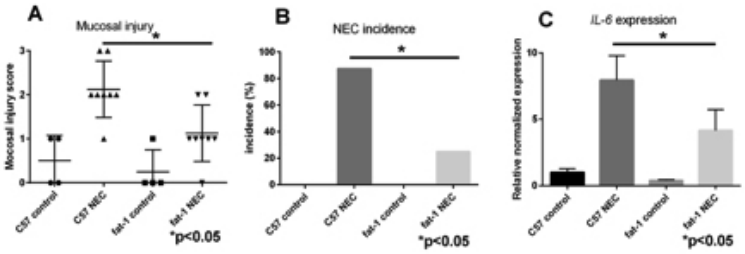
Purpose: Omega-3 polyunsaturated fatty acids (PUFAs) are known to reduce inflammatory response in various diseases. We previously reported that omega-3 PUFAs enriched maternal diet attenuates inflammatory response in experimental model of necrotizing enterocolitis (NEC). To further elucidate the action of omega-3 PUFAs in neonatal mice, we studied fat-1 transgenic mice who convert omega-6 to omega-3 PUFAs. We hypothesized that fat-1 neonatal mice are protected from NEC development.

Methods: Following ethical approval (#32238), we bred mice with two different genetic backgrounds with omega-6 PUFAs enriched diet: (i) wild type (WT); (ii) heterozygous fat-1. On postnatal day 5 (P5) pups were randomly assigned to control breast feeding or NEC induction. From P5 to P9, NEC was induced by hypoxia (5% O_2) for 10 minutes, gavage feeding of hyperosmolar formula (50ul/g) three times a day and gavage administration of 4mg/kg/day lipopolysaccharide. On P9, the pups were sacrificed and the ileum was harvested to evaluate severity of mucosal injury (hematoxylin/eosin stain) and inflammation (*IL-6* mRNA expression). NEC was considered as injury score 2 or more.

Results: As expected in WT mice, NEC induction was associated with higher mucosal injury. However, in fat-1 mice the mucosal injury was lower (Figure A). The incidence of NEC was significantly lower in fat-1 (25%) than in WT (88%) ($p<0.05$. Figure B). Similarly, *IL-6* mRNA expression was significantly lower in fat-1 NEC compared to C57BL/6 NEC ($p<0.05$. Figure C).

Conclusions: Our results indicate that endogenously produced omega-3 PUFAS lead to reduction of NEC incidence, lower mucosal injury and attenuation of inflammation in the intestine. Further studies are needed to detail the mechanism of action of omega-3 PUFAs and design a new preventive strategy for babies at risk of NEC.

Poster Session I (cont.)



Poster Session I (cont.)

P8

LEVELS OF CIRCULATING ENDOTHELIAL PROGENITOR CELLS IN CONGENITAL DIAPHRAGMATIC HERNIA PATIENTS

John D. Stratigis, MD, Matthew M. Boelig, MD, Haiying Li, BS, Holly L. Hedrick, MD, N. Scott Adzick, MD, Alan W. Flake, MD, William H. Peranteau, MD.

The Children's Hospital of Philadelphia, Philadelphia, PA, USA.

Tweet about it: Levels of Circulating Endothelial Progenitor Cells in Congenital Diaphragmatic Hernia Patients

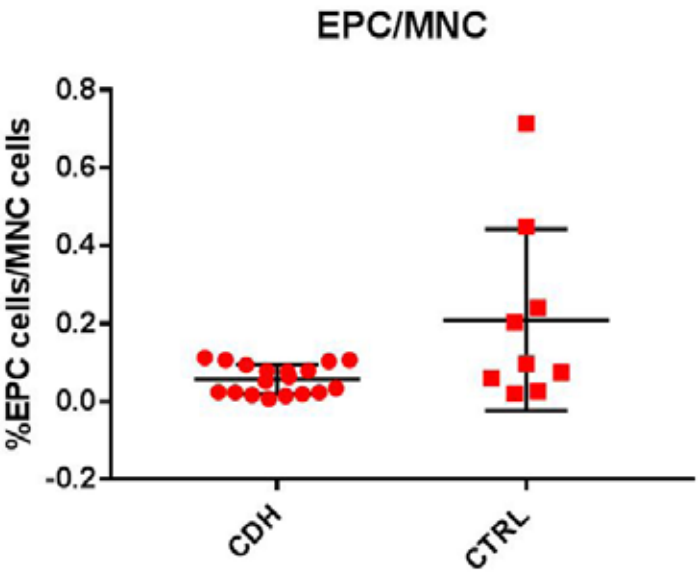
Purpose: Congenital diaphragmatic hernia (CDH) is often associated with severe pulmonary hypertension (PH) and hypoplasia. Endothelial progenitor cells (EPCs) are thought to be important in lung development and maintaining pulmonary vascular homeostasis. There is growing evidence that EPCs are deficient in idiopathic PH and that EPC transfusion may be therapeutic in these patients. In the current study we evaluate the circulating levels of EPCs in CDH patients and hypothesize that levels are decreased compared to controls.

Methods: Blood samples were drawn from patients with CDH (N=18) prior to surgical repair. Patients with congenital conditions not associated with PH (gastroschisis, N=6; cervical lymphangiomas, N=2) served as controls. Mononuclear cells (MNC) were obtained following RBC lysis and stained with fluorophore conjugated antibodies to CD133, CD309, CD34, and 7AAD before analysis on the FACSAria™. Statistical analysis was performed using unpaired T-test with Welch's correction. Values are given as mean±SEM.

Results: Patients in the CDH and control groups were not significantly different in terms of age at blood draw (mean age: 2.625±0.386 days vs 3.444±0.669 days; p=0.154), gender, or delivery method (p=0.24, p=0.60, p=0.4 respectively.) The control group had a significantly lower gestational age (36.75±0.3323 vs 38.56±0.2717; p=0.001.) The CDH group had significantly lower EPC counts as a percentage of MNCs compared to controls (0.057%±0.008% vs 0.209%±0.07%. p=0.044.) Within the CDH population, there was no difference in EPC levels between patients with clinical evidence of PH (require nitric oxide; 0.06%±0.012% EPC levels, N=11) and those without (0.052%±0.015% EPC levels; N=7; p=0.340.)

Discussion: We demonstrate that EPCs are decreased in the circulation of CDH patients compared to controls. These findings highlight a potential prognostic value of EPC levels in CDH patients and support future studies to evaluate a potential therapeutic benefit of EPC transfusion in the management of PH associated with CDH.

Poster Session I (cont.)



Poster Session I (cont.)

P9

ELEVATED NEUTROPHIL ELASTASE, MATRIX METALLOPROTEINASE-2, TENASCIN-C, OSTEOPONTIN, AND EPIDERMAL GROWTH FACTOR ARE ASSOCIATED WITH PULMONARY HYPERTENSION IN NEONATES WITH CONGENITAL DIAPHRAGMATIC HERNIA

Cleo Jui-Hsia Hung, MD, Benjamin G. Wild, MSc, **Stephanie Langlois, PhD**, Kyle N. Cowan, MD, PhD.

Children's Hospital of Eastern Ontario, University of Ottawa, Ottawa, ON, Canada.

Purpose: Congenital diaphragmatic hernia (CDH) has a high mortality rate primarily due to pulmonary hypoplasia and associated pulmonary hypertension (PH). Treatment of PH is a key factor to expedite neonatal stabilization prior to surgical hernia repair as well as to improve survival. To date, existing and evolving therapies for controlling PH have been met with limited success in CDH infants. Our previous studies have demonstrated that remodeling of extracellular matrix (ECM) by elastases and matrix metalloproteinases (MMPs), concomitant with proliferation of pulmonary artery (PA) smooth muscle cells and deposition of ECM proteins in a growth factor-rich environment is pivotal to the progression of pulmonary vascular disease (PVD) in a model of primary PH. In that setting, inhibition of this pathway, using proteinase inhibitors, induced complete regression of primary PH and improved survival. Here we aim to determine whether a similar ECM enzyme dependent progressive PVD pathway is activated in the PAs of neonates with CDH-induced PH.

Methods: Following institutional IRB approval, neutrophil elastase (NE), MMP-2, tenascin-C, osteopontin, epidermal growth factor (EGF), and vascular cell proliferation and apoptosis were assessed by immunohistochemistry in PAs of patients with CDH (n=11) and compared to age matched controls (n=5).

Results: Here we show for the first time that the PAs of neonates with CDH affected by PH have significantly increased levels of NE and MMP-2 as compared to controls. Enhanced matrix protease levels correlated with a significant increase in tenascin-C, osteopontin, and EGF. This provisional growth-supporting environment was associated with an induction in vascular cell proliferation with a concomitant suppression in vascular cell apoptosis.

Conclusions: Taken together, these data suggest that the ECM enzyme-dependent progressive PVD pathway previously identified may also be activated in neonates with CDH and thus may represent a potential novel therapeutic target to treat PH associated with CDH.

Poster Session I (cont.)

P10

CELL SEEDING AND CLINICAL SYMPTOMATOLOGY IN AN OVINE MODEL OF TISSUE-ENGINEERED TRACHEAL GRAFTS

Victoria K. Pepper, MD, Cameron A. Best, BA, Ekene A. Onwuka, MD, MS, Nakesha King, MD, Eric Heuer, BA, Joseph D. Drews, MD, Jed Johnson, PhD, Christopher K. Breuer, MD, Jonathan Grischkan, MD, Tendy Chiang, MD.

Nationwide Children's Hospital, Columbus, OH, USA.

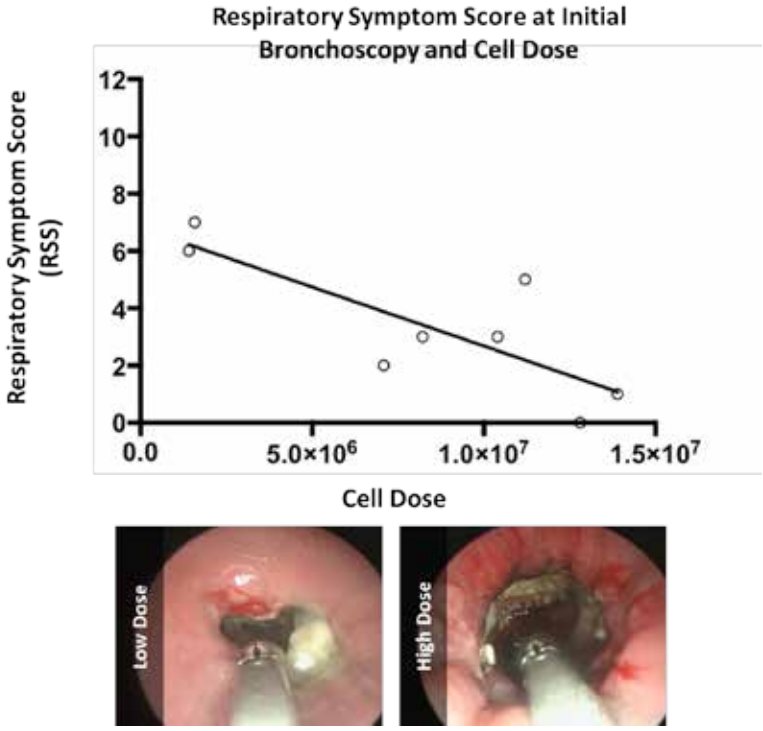
Purpose: Long-segment airway disease is a rare, but frequently fatal problem. Tissue engineering offers the potential to avoid much of the morbidity encountered with current therapeutic options and it has been suggested that cell seeding may mitigate complications such as stenosis. Our aim was to evaluate the impact of cell seeding on the clinical and bronchoscopic findings in tissue engineered tracheal grafts (TETGs) in an ovine model

Methods: Scaffolds composed of 2:8 polyethylene terephthalate:polyurethane with polycarbonate rings were vacuum-seeded with autologous bone marrow-derived mononuclear cells and orthotopically implanted into an ovine model of tracheal replacement (n=8). Cell seeding was quantified by DNA assays. Animals were prospectively monitored and assigned a respiratory symptom score (RSS) based on tachypnea, work of breathing, stridor, wheezing, cough, cyanosis, or sputum production. A total of 12 points was possible. Bronchoscopy was performed at preplanned intervals and when indicated by respiratory distress. If luminal narrowing was greater than 50%, dilation or stenting was performed. Following euthanasia, TETGs were embedded in paraffin or methyl methacrylate

Results: One animal survived to 3 weeks, 3 animals to 6 weeks, and 4 animals to 4 months. The average number of cells seeded on to each scaffold was 8.33±4.46 x $10^6/mm^2$ and the average RSS at first bronchoscopy was 3±2. Two animals (25%) required urgent bronchoscopy prior to planned 3-week surveillance and all animals had greater than 50% luminal narrowing. While there was no association between cell seeding dose and overall survival or time to first bronchoscopy, there was a significant inverse correlation between the respiratory score at first bronchoscopy (p=0.02). On bronchoscopy, granulation tissue with minimal epithelialization was observed at both anastomoses at all time points, with no significant differences based on cell seeding.

Conclusions: In this large animal model, increased cell seeding of TETG is associated with decreased clinical symptomatology.

Poster Session I (cont.)



Poster Session I (cont.)

P11

USE OF RADIOFREQUENCY ABLATION (RFA) FOR SELECTIVE FETAL REDUCTION IN MONOCHORIONIC PREGNANCIES AND OUTCOMES

Claire E. Graves, MD, Erin Washburn, MD, Derek Smith, BS, Angie C. Jelin, MD, Vickie A. Feldstein, MD.

University of California, San Francisco, San Francisco, CA, USA.

Tweet about it: Use of Radiofrequency Ablation (RFA) for Selective Fetal Reduction in Monochorionic Pregnancies & Outcomes: @clairegravesmd discusses other indications for RFA & outcomes after use

Purpose: Selective fetal reduction by RFA has been shown to reduce morbidity and mortality in some complicated monochorionic (MC) pregnancies, most commonly in the setting of twin reversed arterial perfusion (TRAP) sequence. Little is known, however, regarding outcomes for RFA performed for other indications. The purpose of this study was to evaluate outcomes of non-TRAP RFA and identify risk factors for poor outcome.

Methods: Retrospective cohort study of all patients with MC pregnancy from 6/1/04-8/1/16 who underwent RFA for indications other than TRAP (n=44). “Good” outcome was defined as live-born fetus at ≥32 weeks gestational age (GA). “Poor” outcome included demise of non-target fetus or delivery <32 weeks GA. Wilcoxon rank sum and Fisher exact tests were used to compare nonparametric continuous variables and proportions respectively.

Results: Non-TRAP indications for RFA included fetal anomaly (n=18), twin-twin transfusion syndrome (TTTS) (n=13), marked selective growth restriction (n=8), complication following laser ablation for TTTS (n=4), and profound amniotic fluid discordance (n=1). Of the 43 patients with available outcomes, 32 (74%) had a good outcome, and median GA at delivery was 35.5 weeks (interquartile range 32.4-38.1). Those with a poor outcome had a significantly earlier GA at procedure (18.7 vs. 20.8 weeks, p=.03) and were more likely to have had a procedure complicated by septostomy (50% vs. 16%, p=.05)(Table 1). Excluding 2 terminations, overall survival of non-target fetuses--including 3 triplet pregnancies--was 36/44 (82%). Median GA at delivery for survivors was 37.1 weeks (interquartile range 34.1-38.3).

Conclusions: Most patients who undergo selective RFA for non-TRAP indications have good outcomes. Earlier gestational age at time of RFA and septostomy during procedure were associated with worse prognosis.

Poster Session I (cont.)

Table 1: Characteristics of good and poor outcomes

	Outcome		
Variable	**Good**	**Poor**	**P value**
Total pregnancies, n (%)	32 (74)	11 (26)	
Median GA at procedure, wk (interquartile range)	20.8 (19.5-23.1)	18.7 (17.1-21.4)	0.03
Velamentouscord insertion of non-target fetus, n (%)	5 (18)	3 (27)	0.6
Polyhydramnios in non-target fetus, n (%)	11 (35)	5 (45)	0.7
Anterior placenta, n (%)	19 (59)	8 (73)	0.5
Complications, procedure, overall, n (%)	8 (26)	5 (50)	0.2
PPROM, n (%)	4 (13)	2 (18)	0.6
Septostomy, n (%)	5 (16)	5 (50)	0.05

Poster Session I (cont.)

P12

EP2 RECEPTOR BLOCKADE PROTECTS AGAINST INTESTINAL BARRIER BREAKDOWN IN EXPERIMENTAL PERITONITIS

Jamie Golden, MD, Laura Illingworth, BS, Oswaldo Escobar, BS, Patil Kavarian, BS, Christopher P. Gayer, MD, PhD, Anatoly Grishin, PhD, Henri R. Ford, MD, MHA.

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Purpose: High levels of cyclooxygenase-2 (COX-2) and prostaglandin E2 (PGE_2) have been implicated in inflammatory intestinal disorders such as necrotizing enterocolitis and inflammatory bowel disease. Previous work in our lab has shown that COX-2 is upregulated by PGE_2 via activation of pro-inflammatory prostanoid receptor EP2. We hypothesized that blockade EP2 would decrease intestinal barrier breakdown and subsequent inflammation during experimental peritonitis.

Methods: Following IACUC approval, C57bl/6 mice underwent cecal ligation and puncture (CLP) or 30mg/kg lipopolysaccharide (LPS) intraperitoneal injection to induce experimental peritonitis with sham operation or saline injection as a control. Mice were injected intraperitoneally with or without 10mg/kg EP2 receptor antagonist PF-04418948 at time of induction of peritonitis and were orally gavaged with fluorescein isothiocyanate (FITC)-dextran. Mice were sacrificed 12 or 16 hours following induction of peritonitis. Blood samples were analyzed for FITC-dextran to determine intestinal barrier breakdown and terminal ileum was analyzed for COX-2 expression.

Results: CLP and LPS led to increased serum FITC-dextran levels and higher intestinal COX-2 mRNA levels compared with sham and saline animals respectively. PF-04418948 decreased serum FITC-dextran levels from 4.2±0.8 to 2.0±0.5 fold change compared to control ($p<0.05$) in mice who underwent CLP, and from 5.3±3.3 to 3.2±1.9 fold change compared to control in mice injected with LPS. PF-04418948 decreased COX-2 mRNA levels in terminal ileal samples from CLP mice (25±19 vs 9±3.3 fold control) and from LPS mice (4.2±7.2 to 1.9±1.8 fold control).

Conclusion: EP2 receptor inhibition protects against intestinal barrier breakdown during experimental peritonitis and may inhibit the positive feedback induction of COX-2 via PGE_2 activation of EP2. This suggests that EP2 receptor specific inhibition may have important therapeutic implications in the treatment of inflammatory intestinal disorders such as necrotizing enterocolitis and inflammatory bowel disease.

Poster Session I (cont.)

P13

SHORT-TERM NEURODEVELOPMENTAL OUTCOME IN CHILDREN BORN WITH HIGH-RISK CONGENITAL LUNG LESIONS

Enrico Danzer, MD, Casey Hoffman, PhD, Jo Ann D'Agostino, DNP, CRNP, Matthew M. Boelig, MD, Marsha Gerdes, MD, Judy Bernbaum, MD, Natalie E. Rintoul, MD, Lisa Herkert, CRNP, Lindsay N. Waqar, MPH, William H. Peranteau, MD, Alan W. Flake, MD, N Scott Adzick, MD, Holly L. Hedrick, MD.

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Purpose: To evaluate the short-term neurodevelopmental outcome in children born with high-risk congenital lung lesions (CLL) who underwent prenatal or urgent postnatal intervention and to identify risk factors associated with developmental delays.

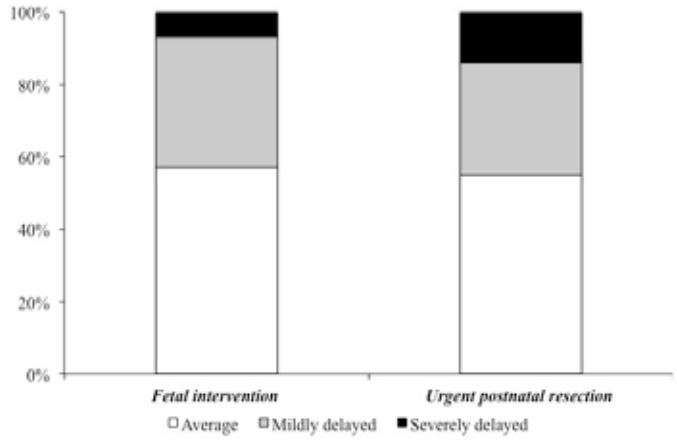
Methods: The study cohort consists of 43 CLL survivors who were enrolled in our follow-up program between 01/2006 and 07/2016. Cognitive, language, and motor outcome were assessed using the Bayley Scales of Infant Development, 3rd Edition. Scores were grouped as average, mildly delayed, and severely delayed based on standard deviation (SD) intervals (85-115, 70-84, ≤69, respectively). Correlations between neurodevelopmental outcome and risk factors were analyzed by Fisher's exact test or two-sided t-test as appropriate, with significant p values <0.05.

Results: Fourteen (33%) children required open prenatal intervention (fetal resection, n=4; ex utero intrapartum therapy, n=10) and 29 (67%) developed acute respiratory distress postnatally necessitating urgent resection at a median of day of life 1 (0-23). Twenty-two (51%) patients received betamethasone prenatally. A total of 13 (30%) children underwent fetal thoracoamniotic shunting. Median age at follow-up was 20 months (5-42). As a group mean cognitive (94±12), language (90±17), and motor (94±17) composite scores were within the expected normal range (100±15). Approximately one-third of patients had mild delays in at least one domain tested (Figure 1). Two (5%) children scored within the severe delayed range for all domains. No significant differences were found among the fetal intervention and urgent postnatal resection patients for any domains tested (P=1.00). Need for high frequency oscillatory ventilation (P=0.041), prolonged ventilatory support (P=0.019), and prolonged NICU stay (p=0.011) were associated with neurological delays.

Conclusions: Mean neurodevelopmental scores for patients with high-risk CLL are age-appropriate. Neither fetal intervention nor the need for urgent postnatal resection increases the risk of neurological dysfunction. Surrogate markers of a complicated neonatal course appear to be predictive of adverse neurodevelopmental outcome.

Poster Session I (cont.)

Figure 1. Prevalence and severity of impairment based on SD intervals (P=1.00).



Poster Session I (cont.)

P14

ANALYSIS OF EXTRACELLULAR RNAS IN AMNIOTIC FLUID AND CORD BLOOD: A "PRECISION MEDICINE" APPROACH FOR FETAL THERAPY

Russell G. Witt, MD, MAS, Paula Godoy, BS, Michela Frascoli, PhD, Anita Grady, MD, Prescott Woodruff, MD, MPH, Tippi MacKenzie, MD.

University of California, San Francisco, San Francisco, CA, USA.

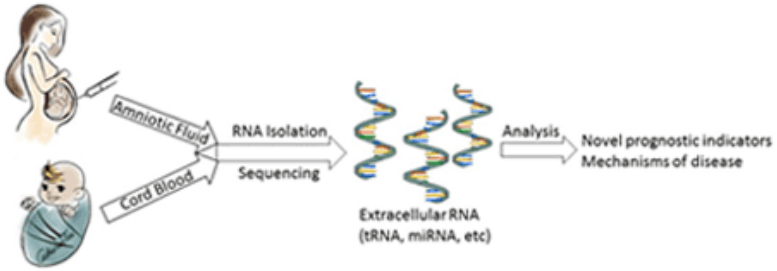
Purpose: Congenital anomalies fall along a spectrum of disease severity and defining a prognosis for each individual fetus is critical for patient counseling. While current prognostic indicators (such as lung-to-head ratio for congenital diaphragmatic hernia) rely on anatomic measurements obtained by ultrasound or MRI, we hypothesize that analysis of extracellular RNAs (exRNAs) may provide a more accurate picture of individual physiology and improve our ability to predict the prognosis for each patient.

Methods: We analyzed the feasibility and reproducibility of exRNA isolation and sequencing from amniotic fluid (n=26), adult plasma (n=11) and cord plasma (n=17). Libraries were prepared with a modified small RNA-sequencing protocol. Unsupervised hierarchical clustering was carried out after DESeq normalization using the Euclidean distance metric. The log2 fold change relative to the global average was plotted for the most variable miRNAs across all samples.

Results: ExRNAs from amniotic fluid were present at significantly different relative abundances than in cord and adult plasma. Hierarchical clustering showed excellent separation between healthy patients and those with congenital anomalies (amniotic fluid) and preterm labor (cord plasma) (Figure 1). Within cord plasma, 37 exRNAs were found to be significantly different between term and preterm infants; these included numerous exRNAs previously described in the female reproductive tract providing molecular clues into the etiology.

Conclusions: ExRNA sequencing is feasible from small volumes of biofluids and reliably separates patients with two disease subtypes in an unbiased fashion. The ability to identify individual exRNAs in amniotic fluid is exciting, since this test could be used as an adjunct to current prognostic measures for congenital diseases. Further characterization of uniquely altered exRNAs will allow for understanding of disease pathways leading to pulmonary hypertension and other complications. In the future, identification of exRNAs in maternal plasma may provide a less invasive method for risk stratification of patients with birth defects.

Poster Session I (cont.)



Poster Session I (cont.)

P15

FXR IS IMPORTANT IN CONTROLLING GLUCOSE HOMEOSTASIS AFTER SLEEVE GASTRECTOMY IN A MOUSE MODEL OF OBESITY

Monica D. Chow, MD[1], Andrew M. Wassef, BA, BS[2], Bo Kong, PhD[3], Jianliang Shen, MS[3], Laura E. Armstrong, PhD[3], Mingxing Huang, MD[4], Justin D. Schumacher, PharmD[3], Daniel Rizzolo, BA[3], Min Zhang, MD[5], Ragui W. Sadek, MD[6], Grace L. Guo, MBBS, PhD[3], Yi-Horng Lee, MD[7].

[1]Department of General Surgery, Rutgers-Robert Wood Johnson Medical School, New Brunswick, NJ, USA, [2]Rutgers-Robert Wood Johnson Medical School, New Brunswick, NJ, USA, [3]Department of Pharmacology and Toxicology, Ernest Mario School of Pharmacy, Rutgers University, Piscataway, NJ, USA, [4]Fifth Affiliated Hospital of Sun-Yat Sen University, Zhuhai, China, [5]Center of Children's Liver Disease, 302 Hospital of PLA, Beijing, China, [6]Department of Surgery, Rutgers-Robert Wood Johnson Medical School, New Brunswick, NJ, USA, [7]Division of Pediatric Surgery, Department of Surgery, Rutgers-Robert Wood Johnson Medical School, New Brunswick, NJ, USA.

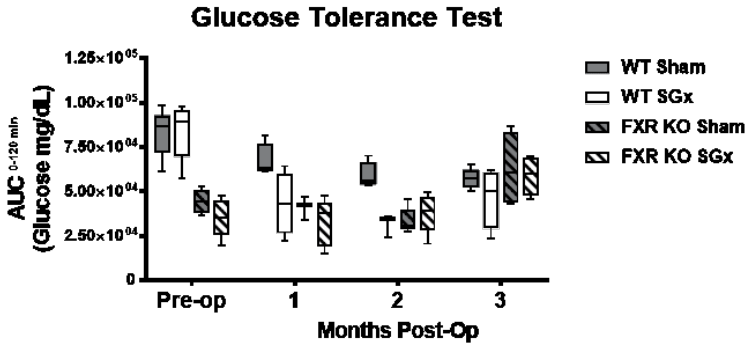
Purpose: Bariatric surgery is an effective weight-loss option for the obesity epidemic with the benefit of correcting metabolic diseases such as type 2 diabetes mellitus in a weight-independent fashion. The mechanism for this remains unclear. Sleeve gastrectomy (SGx) is the most common bariatric surgical procedure in adolescent obese patients. Circulating bile acid (BA) levels in SGx patients are increased and is associated with improved insulin sensitivity. Farnesoid X receptor (FXR) is an essential regulator in BA homeostasis. Therefore, we used a mouse model of SGx to test the hypothesis that FXR plays an essential role in glucose control following bariatric surgery in obese subjects.

Methods: Six-week-old male wild type (WT) and FXR whole-body knockout (KO) mice on C57BL/6J genetic background received high fat diet for 12 weeks before undergoing SGx or sham operations. Oral glucose tolerance test was performed in WT and FXR KO mice one week before surgery and then monthly after surgery for up to 3 months. The area under the curve was used to compare cohorts. Two-way analysis of variance (ANOVA) followed by Tukey's post-hoc test were used to analyze the data ($\alpha < 0.05$).

Results: WT-SGx mice had improved glucose tolerance at months 1 ($p = 0.0001$), 2 ($p = 0.0001$), and 3 ($p = 0.0001$) post-surgery compared to their preoperative glucose control. WT-Sham mice also had improved glucose control postoperatively but to a lesser extent than WT-SGx mice. FXR KO-SGx and FXR KO-sham mice showed no improved glucose tolerance postoperatively.

Conclusions: FXR appears to be needed for improving glucose tolerance after sleeve gastrectomy. Additionally, improved glucose tolerance after sleeve gastrectomy is weight-independent. Further study of FXR and bile acids is required to better understand the mechanism by which metabolic diseases improve after bariatric surgery.

Poster Session I (cont.)



Poster Session I (cont.)

P16

CONVERSION OF VENOVENOUS TO VENOARTERIAL CANNULATION INCREASES ECMO MORTALITY

Seth D. Goldstein, MD[1], Jose Salazar, MD[2], Nicholas Culbertson, BS[1], Vivian Wang, MD[3], Fizan Abdullah, MD, PhD[4], Alejandro Garcia, MD[1].

[1]Johns Hopkins Hospital, Baltimore, MD, USA, [2]University of Maryland Medical Center, Baltimore, MD, USA, [3]Emory School of Medicine, Atlanta, GA, USA, [4]Ann & Robert H. Lurie Children's Hospital, Chicago, IL, USA.

Purpose: Venovenous (VV) extracorporeal membrane oxygenation (ECMO) does not provide circulatory augmentation, unlike venoarterial (VA) cannulation. Recent reports demonstrate an increasing national trend towards initial VV support for cardiopulmonary failure. VV ECMO carries many advantages, however a proportion of children will ultimately require conversion to VA for persistent hemodynamic instability. The purpose of this work is to perform a descriptive analysis of patients in a national registry who were converted from VV to VA ECMO.

Methods: Data on neonates and children less than 18 years of age who underwent VV-VA ECMO conversion from 1982 to 2013 were extracted from the Extracorporeal Life Support Organization (ELSO) registry. Patient characteristics, physiologic parameters pre-and post-cannulation, and outcomes were included for analysis.

Results: This study cohort consisted of 1,408 ECMO patients, comprising 2.9% of registry entries. Data were analyzed from 810 neonates (median 1 day old, 3.3 kg) and 398 children (median 1 year old). The hospital survival rate for neonates requiring conversion was 61%, compared to 75% and 71% for VV and VA cannulations, respectively. Similarly, the survival of older children requiring conversion was 46% compared to 64% and 52%. The ranges of reported pre-ECMO support settings were wide across all ages.

Conclusions: VV to VA conversion may represent an error in judgment of recognizing physiologic parameters that would be better managed with initial VA support. The delay in circulatory support may be a factor in this cohort's decreased survival compared to both VV and VA initial cannulations. As practice patterns trend towards a predominance of VV ECMO, it is increasingly important to investigate factors influencing ECMO outcomes in order to inform initial circuit strategy.

Poster Session I (cont.)

P17

PULMONARY TRANSCRIPTOME ANALYSIS OF HUMAN CONGENITAL DIAPHRAGMATIC HERNIA 3D LUNG ORGANOIDS

Guihua Jiang, MS, Kendal A. Walker, BS, **Cory N. Criss, MD**, K. Sue O'Shea, PhD, Jason R. Spence, PhD, Shaun M. Kunisaki, MD, MSc.

University of Michigan, Ann Arbor, MI, USA.

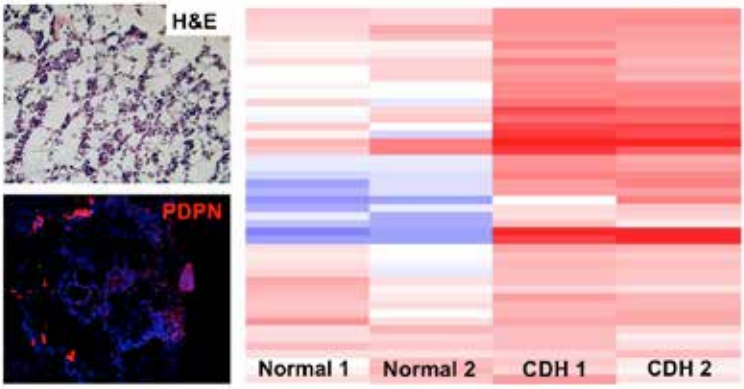
Purpose: Current understanding of the molecular regulation governing congenital diaphragmatic hernia (CDH) lung organogenesis continues to be limited and is derived mostly from animal models that do not fully recapitulate the human disease phenotype. We have previously shown that 3D fetal lung-like micro-tissues, or lung organoids, can be generated from induced pluripotent stem cells (iPSCs) in CDH neonates. Here, we aimed to define pulmonary transcriptome patterns within developing CDH lung organoids.

Methods: Human dermal fibroblasts from CDH infants (n=2) were reprogrammed into transgene-free iPSCs and differentiated into lung organoids in the absence of compression forces. After confocal microscopy, we used a customized microarray analysis of 164 extracellular matrix (ECM) and 186 lung development genes based on the Human Gene ST 2.1 PCR platform (Affymetrix) with normal fetal lung and lung organoids from non-CDH patients as controls. Values were normalized based on parental dermal fibroblast and definitive endoderm and validated by qPCR.

Results: CDH lung organoids were successfully generated as revealed by alveolar-like structures expressing E-cadherin, Nkx2.1, surfactant protein, and PDPN (Figure). Microarray analyses revealed that 77% of ECM genes were markedly upregulated in CDH lung organoids compared to control organoids after allowing for a false-discovery rate of 0.1 and a fold change of 2 (Figure). Among the genes with the highest relative expression in CDH were aggrecan, TGFβ-1, and periostin. However, genes associated with lung development, including SHH, GATA4, GATA6, FOXA2, and retinol binding protein-4 were markedly downregulated in CDH lung organoids compared to controls. Results were confirmed by qPCR.

Conclusions: A unique transcriptome pattern consistent with mesenchymal dysfunction emerges during 3D CDH lung organoid development, characterized by ECM upregulation and transcription factor-associated downregulation in genes linked with lung maturation. Further work using this "disease-in-a-dish" approach may serve as a novel in vitro platform for disease pathogenesis modeling in CDH lung hypoplasia.

Poster Session I (cont.)



Poster Session II

Poster Session II: Clinical
Thursday, May 4, 4:30 – 6:15 p.m.

P18

RIGHT VS. LEFT CONGENITAL DIAPHRAGMATIC HERNIA - WHAT'S THE DIFFERENCE?

Carmen Mesas Burgos, MD, PhD[1], Björn Frenckner, MD, PhD[1], Matias Luco, MD[2], Pamela A. Lally, MD[3], Matthew T. Harting, MD[3], Kevin P. Lally, MD[3].

[1]Karolinska Institutet, Stockholm, Sweden, [2]Pontificia Universidad Católica, Santiago de Chile, Chile, [3]McGovern Medical School at UT Health and Children's Memorial Hermann Hospital, Houston, TX, USA.

Purpose: Right-sided congenital diaphragmatic hernias (CDH) and larger defect sizes have been associated with poorer outcomes. The aim of this study was to evaluate right and left sided CDH in terms of size, survival, associated anomalies and morbidity

Methods: We used information from a multicenter, multinational database on CDH from 2007 to 2015. All infants with data on defect side were included for this analysis. We compared differences in outcomes between right and left sided CDH. Further analysis on the association between side, size of the defect and outcome was performed for those infants where the defect size was recorded.

Results: A total of 3754 cases of CDH were entered in the registry between January 2007 and September 2015, with an overall survival of 71%. Of those, 598 (16%) were right-sided and 3156 left sided, with a survival rate of 67% and 72% respectively**.** Right sided CDH had a larger proportion of C and D defects. Survival rates for the same size defect were similar independently of the side of the defect. Multivariable logistic regression analysis showed a significant correlation between survival and defect size ($p<0.0001$, OR 3.49, 95% CI 2.9-4.1), but not side.

Conclusions: The higher proportion of large defects (C and D) in right sided CDH but not the side itself significantly affects outcome for diagnosed CDH

Frequencies and outcomes for Right and Left-sided CDH. Fisher's test, *p<0.05.

Defect size	n	Right CDH (%).	Left CDH (%)	Survival Right CDH (%)	Survival Left CDH (%)	Overall Survival (%)
A	445	9	15*	98	98	98
B	1258	29	42*	92	95	93
C	981	44	31*	76	74	75
D	395	17	13*	61	52	57

Poster Session II (cont.)

P19

PREDICTORS OF PEDIATRIC BLUNT CEREBROVASCULAR INJURY

Avery C. Rossidis, MD[1], Sasha J. Tharakan, MD[1], Sourav K. Bose, MSc[2], Michael L. Nance, MD[1], Thane A. Blinman, MD[1].

[1]The Children's Hospital of Philadelphia, Philadelphia, PA, USA, [2]Perelman School of Medicine, Philadelphia, PA, USA.

Purpose: Blunt cerebrovascular injury (BCVI) remains a source of clinical uncertainty given that optimal screening criteria, diagnostic imaging modality, and treatment have not been standardized. This study aims to determine risk factors for BCVI in pediatric patients and to evaluate screening and management practices in a single institutional series.

Methods: A retrospective review of all pediatric blunt trauma patients (age 0-18 years) admitted over a 10-year period (1/1/2005-12/31/2014) was performed. Demographic, clinical, and radiographic data were obtained, including Injury Severity Score (ISS) and the presence of conventional adult risk factors for BCVI (Glasgow coma scale (GCS) score ≤ 8, basilar skull fracture, cervical spine fracture, cervical ligamentous injury, complex facial fracture, and diffuse axonal injury). Univariate and multivariate logistic regression analyses were performed with statistical significance established at $p<0.05$.

Results: Of the 11,596 pediatric blunt trauma patients admitted during the study period, 1,018 (8.8%) had at least one adult risk factor for BCVI, but only 62 (6.1% of those with risk factors) underwent angiographic evaluation. Overall, 11 BCVIs were observed (4 carotid and 7 vertebral), resulting in an incidence of 0.095%. All 11 patients with BCVI had at least one conventional risk factor; 3 of 11 (27%) presented with infarcts on admission and 8 (73%) were treated with aspirin. There were no secondary strokes after diagnosis and there were no deaths. Multivariate regression analysis identified male gender ($p=0.0212$), ISS ($p=0.0016$), GCS≤8 ($p=0.0090$), cervical spine fracture ($p<0.0001$), and Le Fort II or III facial fracture ($p=0.0215$) as independent risk factors for BCVI.

Conclusion: Adult screening criteria for blunt cerebrovascular injury appear appropriate for pediatric patients, but the majority of at-risk children are not screened, leaving the true incidence and potential for missed injuries unknown. Standardized guidelines, assessed in a prospective fashion, are needed to elucidate optimal screening, diagnostic, and management strategies for pediatric blunt cerebrovascular injury.

Poster Session II (cont.)

P20

THE IMPACT OF RACIAL/ETHNIC DISPARITIES ON SURVIVAL FOR CHILDREN AND ADOLESCENTS WITH EXTREMITY SOFT TISSUE SARCOMA: A POPULATION-BASED STUDY

Michael Joseph, MPH[1], **Emma C. Hamilton, MD**[1], Winston W. Huh, MD[2], Andrea A. Hayes-Jordan, MD[2], Mary T. Austin, MD, MPH[2].

[1]McGovern Medical School, Houston, TX, USA, [2]The University of Texas MD Anderson Cancer Center, Houston, TX, USA.

Purpose: To determine whether racial/ethnic disparities exist in disease presentation, treatment and survival among children and adolescents with extremity soft tissue sarcoma (STS).

Methods: The Surveillance, Epidemiology and End Results (SEER) data was analyzed for patients <20 years old diagnosed with extremity STS from 1973-2013. Multivariate logistic regression was performed to determine the association between race/ethnicity and disease stage at presentation and the likelihood of surgical resection. Overall survival (OS) was evaluated using hazard ratios with 95% confidence intervals. All statistics were calculated with SPSS Statistics Version 23. ($p<0.05$)

Results: 1261 cases were identified: 650 (52%) non-Hispanic whites (NHW), 313 (25%) Hispanics, 182 (14%) non-Hispanic blacks (NHB) and 116 (9%) other race/ethnicity. Median age at diagnosis was 14 years $\pm$ 5.9. Male sex, NHB race/ethnicity, rhabdomyosarcoma (RMS) histology, and tumor size >= 5cm were associated with advanced stage disease. The majority underwent surgical resection (89%, n=1119) with most receiving limb-salvage procedures (89%, n=994). After controlling for patient- and disease-related factors, minority patients were significantly less likely to undergo surgical resection. Additional factors associated with failure to undergo surgical resection included RMS histology, lower extremity primary site, tumor size >= 5cm, and presenting with distant metastases. 5- and 10-year overall survival (OS) for the cohort is 78% and 72%, respectively. OS based on race/ethnicity differed based on the log-rank test with NHB having the worst survival rate ($p<0.05$). Predictors of worse OS were older age, tumor size >= 5cm, regional and distant metastases, and RMS histology.

Conclusions: NHB children and adolescents are more likely to present with advanced stage disease and die of extremity STS compared to NHW. In addition, minorities were less likely to undergo surgical resection. Further work is needed to better characterize and eliminate disparities in the management and outcomes of children with extremity STS.

Poster Session II (cont.)

P21

THE IDLE CENTRAL VENOUS CATHETER IN THE NICU: WHEN SHOULD THEY BE REMOVED?

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Purpose: There is ongoing debate regarding the optimal timing of central line removal in the neonatal intensive care unit (NICU). Our experience has been that peripherally inserted central catheters (PICC) are generally removed when no longer in use, whereas surgically-placed tunneled central venous catheters (T-CVC) are removed closer to discharge. The purpose of this study was to evaluate outcomes of idle PICCs and T-CVCs and determine the incidence of line-related infections and line replacements.

Methods: IRB approval was obtained (IRB 00087730). Patients in the NICU who had T-CVCs placed between 11/2008-8/2015 (n=134) or PICCs placed between 7/2013-10/2015 (n=467) were included. Statistical analysis was performed using Student's *t* test or the chi-square test and significance was set at $p<0.05$.

Results: Table 1 compares central line practice patterns and outcomes. The most common indications for line placement were parenteral nutrition for PICCs (74%) and lack of access for T-CVCs (43%). T-CVCs had a greater proportion of idle days (T-CVC- 25% vs PICC- 5%, p<0.05) and lines removed within 24 hours of discharge (T-CVC-53% vs PICC-6%, p<0.05). Conversely, 81% of PICCs were removed within 24 hours of non-use. Line replacement after removal for non-use was required in 6% of PICCs and none in T-CVCs. In both groups, the CLABSI rate (per 1000 line days) was lower in idle lines compared to lines that were in use.

Conclusion: Patients treated with peripherally inserted and tunneled central venous catheters are different populations, and therefore should have different guidelines for removal. In neonates with difficult access, the low risk of central line-associated bloodstream infections in idle surgically-placed catheters may justify maintaining access until discharge.

Table 1. Comparison of central line practice patterns and outcomes

Outcome	T-CVC (n=134)	PICC (n=467)	p-value
Birth weight, g	2143 ± 1153	1905 ± 1016	<0.05
Age at insertion, d	40 ± 49	6 ± 11	<0.05
Line utilization ratio (line day/pt day)	0.52	0.27	<0.05
Number of idle days, n (%)	1855 (25)	411 (5)	<0.05
Removed within 24 hrs of discharge, n (%)	73 (53)	27 (6)	<0.05
Overall CLABSIs (per 1000 line days)	1.9	1.2	1.0
CLABSIs in lines in use (per 1000 line days)	2.2	1.2	1.0
CLABSIs in idle lines (per 1000 line days)	1.1	0	1.0
Overall other complications, n (%)	8 (6)	32 (7)	0.89

Poster Session II (cont.)

P22

IMPROVEMENTS IN VASCULAR HEALTH IN OBESE ADOLESCENTS AFTER SURGICAL WEIGHT LOSS

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Purpose: Adolescent obesity is associated with diabetes and hypertension and may predispose adolescents to cardiovascular disease in adulthood. The body mass index(BMI) of 1/6th of adolescents in our state is elevated over the 95th percentile. Given the potential benefits of surgical weight loss, our objective was to evaluate if surrogate markers of arterial health correlated with weight loss following sleeve gastrectomy.

Methods: Adolescent patients and families visiting a multi-disciplinary weight loss clinic and deemed suitable for sleeve gastrectomy were recruited into this study. 8 patients were consented but one patient withdrew prior to the operation. 7 patients(5 female, 2 male) underwent baseline, pre-operative, and post-operative evaluation, with 1 patient missing their post-operative visit. Surrogates of arterial health included carotid duplex(to assess carotid intimal thickness), pulse wave velocity(a surrogate of stiffness), and brachial artery flow mediated dilation(a measure of stiffness and endothelial cell function).

Results: The average baseline BMI for the patients was 47.4+/-5.5 kg/m^2. After surgery the BMI decreased by 14%+/-4%, achieving an average excess weight loss of 25%+/-7% [mean follow-up time of 81+/-20 days]. Complete ultrasound evaluation was achieved in 3 patients. These 3 patients had improvements in their pulse wave velocity (decreased arterial stiffness) by 11%, 23%, and 18%(p=0.016). There were no significant differences in other arterial health studies.

Conclusion: This work supports a correlation between pulse wave velocity and weight loss after sleeve gastrectomy. Follow-up studies in the remaining patients will help demonstrate the consistency of this correlation. Further examination of the reversibility of arterial stiffness in obese adolescents may be useful in restoring cardiovascular health within the epidemic of obesity.

Poster Session II (cont.)

Clinical Patient Data of Weight Loss Following Sleeve Gastrectomy

Patient Number/ Gender	Initial Weight (kg)	Initial BMI	Pre-op BMI	Post-op BMI	Days to f/u	Excess Weight Loss
1/F	142	49.7	48.7	44.9	54	16.9%
2/F	120	42.0	42.4	33.5	93	40.6%
4/F	102	45.3	44.9	37.1	101	32.7%
5/M	156	47.0	48.3	40.5	92	28.1%
6/M	190	56.7	57.9	50.7	89	17.6%
7/F	117	50.6	51.9	N/A	Missed 3 month clinic appointment	N/A
8/F	113	40.5	39.4	36.2	59	23.2%

Poster Session II (cont.)

P23

PEDIATRIC VASCULAR TRAUMA PRACTICE PATTERNS SURVEY: A POSSIBLE GAP IN RESOURCES OF FREESTANDING CHILDREN'S HOSPITALS

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Purpose: Wide variation appears to exist in pediatric vascular trauma management. The aims of this survey are to: 1) determine variations in practice patterns for vascular trauma management at American College of Surgeons (ACS) verified pediatric trauma centers across the United States and 2) evaluate the resources available for management of vascular trauma at freestanding children's hospitals (FSCH).

Methods: A survey was sent to pediatric surgeons and trauma medical directors at ACS pediatric surgery trauma centers. The survey was designed to capture participant demographic information and evaluate anticipated management of traumatic brachial, femoral, popliteal, carotid, aortic, and subclavian arterial injuries. Questions specifically for the medical director evaluated resource availability. Comparisons between hospital settings were made using Fisher's exact tests and t-tests. The proportions of surgical subspecialty anticipated to operatively manage vascular trauma at all anatomic sites were compared using binomial tests. P-values ≤0.05 were considered statistically significant.

Results: 176 of 414 (42%) pediatric trauma surgeons at 49 level I and 36 level II pediatric trauma centers participated. Vascular surgeons are three times more likely to operatively manage vascular trauma at all anatomic sites except for the subclavian when compared to pediatric surgeons, regardless of hospital setting ($p < 0.001$). 48% of the pediatric trauma medical directors completed their portion of the survey. 36% ($p=0.015$) did not have a fellowship trained vascular surgeon on a circulated call schedule. 27% ($p=0.132$) did not have endovascular capability including stent placement and 18% ($p=1.000$) did not have a radiology technologist. Medical directors within adult hospitals indicated the availability of the above resources 100% of the time.

Conclusions: Vascular surgeons are three times more likely to manage pediatric vascular trauma. Based on this survey, FSCH have fewer resources available to optimally care for these children. The current ACS Committee on Trauma guidelines do not require vascular surgeon coverage at FSCHs.

Poster Session II (cont.)

P24

MORBIDITY AND MORTALITY AMONG "BIG" BABIES WHO DEVELOP NECROTIZING ENTEROCOLITIS - A PROSPECTIVE MULTICENTER COHORT ANALYSIS

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Tweet about it: Morbidity & Mortality of NEC in "Big Babies" (birth weight >2500g): congenital anomalies, sepsis, and surgery for NEC are associated with higher mortality

Background: Necrotizing enterocolitis (NEC) is classically a disease of prematurity, with incidence and mortality increasing with lower birth weight among preterm infants. We investigated morbidity and mortality among neonates weighing >2500g at birth who developed NEC.

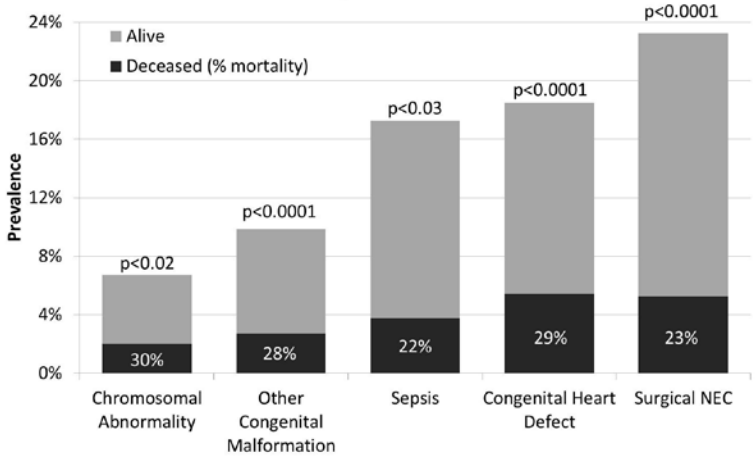
Methods: Data were prospectively collected 2009-2015 on all neonates admitted to one of 252 participating NICUs within 28 days of birth. Infants weighing >2500g at birth diagnosed with significant NEC (minimum Bell's stage II) were analyzed. Multivariate regression was used to assess risk factors for mortality and length of stay. Data are presented as percent or median (Q1, Q3).

Results: There were 1,629 included neonates (60% male), with gestational age 37 (36, 39) weeks. Major congenital anomalies were seen in 44%, most commonly gastrointestinal defects (20%), congenital heart defects (18%), and/or chromosomal anomalies (7%); 10% had other congenital anomalies. In this cohort, 23% of infants underwent surgery for NEC, including 39 infants who underwent primary peritoneal drainage. Mortality was 23% among infants with surgical NEC and 8% among infants with medical NEC, with length of stay of 62 (36, 93) and 34 (22, 61) days, respectively. Significant independent predictors of mortality were congenital heart defects ($p<0.0001$), chromosomal abnormalities ($p<0.02$), other congenital malformations ($p<0.0001$), surgical NEC ($p<0.0001$), and sepsis ($p<0.03$) (Figure 1). In addition to these factors, 1 minute Apgar ($p<0.0001$) and gastrointestinal defects ($p<0.0001$) were predictors of increased length of stay among survivors. Major nutritional morbidity was observed at discharge: 6% were receiving no enteral feeds, and 27% were <10th percentile weight for age, although at birth only 8% were small for gestational age.

Conclusions: Major congenital anomalies are present in nearly half (44%) of >2500g birth weight infants who develop necrotizing enterocolitis. Morbidity and mortality increases with sepsis, surgical disease, and congenital anomalies. These infants are at high risk for growth failure at discharge.

Poster Session II (cont.)

Prevalence and percent mortality of significant independent predictors of death among >2500g birth weight infants with NEC (n=1,629). Overall mortality in this cohort was 11%.



Poster Session II (cont.)

P25

MORE OF THE SAME: AGE AT ORCHIOPEXY FOR UNDESCENDED TESTIS IN THE UNITED STATES

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Purpose: Undescended testis (UDT) is the most common congenital anomaly of the male genitalia. The American Academy of Pediatrics in 1996 and, more recently, the American Urological Association in 2014 have released guidelines recommending orchiopexy for UDT by age 1 and no later than 18 months given the significant impact of timing on the risk of sub-fertility and malignancy. We sought to assess adherence to these guidelines on a national level.

Methods: We retrospectively reviewed both the 2012 State Ambulatory Surgery Database (SASD) and the 2015 Pediatric Health Information System (PHIS) to better capture practices within and outside children's hospitals. All patients aged 18 years or less who underwent orchiopexies for UDT were included. Demographic data including age at repair, surgeon type and payer status were extracted. Descriptive analysis was performed using STATA, with separate analyses for each dataset. Associations were tested with a level of significance of 0.05.

Results: Analysis of the 2012 SASD for New Jersey, Florida and Maryland yielded 1654 patients with a median age of 4 years (IQR 1-8) with 1048 (64%) having orchiopexy later than age 2. A total of 844 males were identified from the PHIS database. Of these, 63% were White. The median age at repair was 5 years (IQR 1-9). There were 577 (68%) of patients older than 2 years at orchiopexy. No significant associations were found with race or payer status.

Conclusion: Almost 70% of orchiopexies for UDT in the United States occur at least 12 months later than the recommended age, with 50% of these delayed by 24-36 months. Older studies have yielded similar results, suggesting that poor adherence to the standard of care has shown no improvement for over a decade. The role of provider education and reliance on imaging before referral need to be investigated.

Poster Session II (cont.)

P26

OVERUTILIZATION OF ANTIBIOTICS IN ELECTIVE LAPAROSCOPIC CHOLECYSTECTOMY: NEED FOR BETTER STEWARDSHIP IN PEDIATRIC SURGERY

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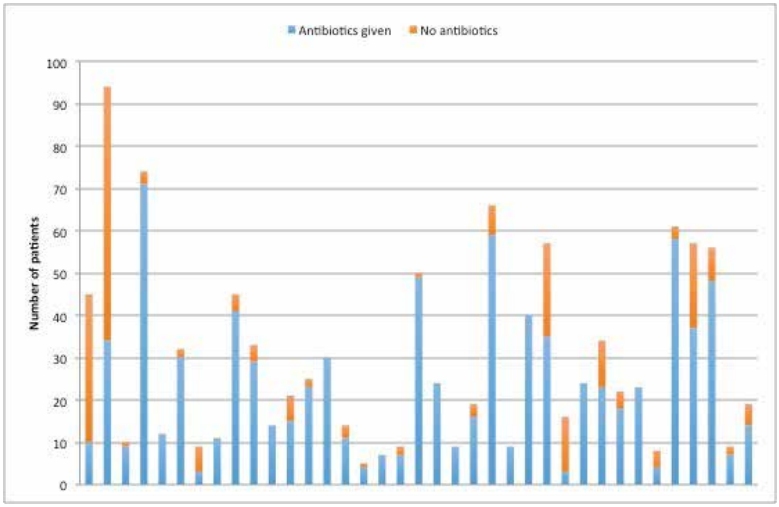
Purpose: The role of routine prophylactic antibiotics for elective laparoscopic cholecystectomy performed for symptomatic cholelithiasis (SC) or biliary dyskinesia (BD) has been questioned over the last decade. This practice has been extensively studied and is no longer recommended in the adult patient population. However, the practice among pediatric surgeons remains unknown. Our aim was to investigate the use of routine perioperative antibiotics in children undergoing elective laparoscopic cholecystectomy (LC) for SC and BD in a national cohort of freestanding children's hospitals.

Methods: We retrospectively reviewed the Pediatric Health Information System (PHIS) database for the years 2014-2015 and selected all patients 18 years old or younger who underwent LC for the diagnoses of cholelithiasis (without cholecystitis) or BD. Demographic and hospital data were extracted as well as antibiotics administered, hospital length of stay and surgical complications. Descriptive analysis was performed using STATA. IRB approval was obtained.

Results: A total of 1112 patients from 44 hospitals were identified with a median age of 15 years (IQR 13-16 years). Eight out of 10 hospitals routinely give prophylactic antibiotics in more than 50% of patients. In 37 hospitals that performed more than 5 LC during the two-year period, the percentage of children given antibiotics ranged from 19 to 100% (see Figure 1). No 30-day surgical complications were identified in those who did not get antibiotics. A sensitivity analysis among older children (>=12 yrs) showed similar distribution.

Conclusion: Significant practice variations exist among children's hospitals in administration of antibiotics for laparoscopic cholecystectomy, despite evidence to the contrary. While some follow current recommendations, most hospitals do not. The role of wound classification in propagating the practice needs to be investigated. Also, antibiotic administration could be tracked as a quality metric in the current push for better stewardship.

Poster Session II (cont.)



Poster Session II (cont.)

P27

OVERUTILIZATION OF ICU RESOURCES FOR ISOLATED LOW-GRADE SOLID ORGAN INJURIES TO THE ABDOMEN IN BLUNT PEDIATRIC TRAUMA

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Tweet about it: ICU overutilization continues for low-grade blunt abdominal trauma in children. 17y since APSA recs suggesting otherwise.

Purpose: An abbreviated bed-rest protocol based on the 1999 APSA-recommendations for management of solid organ injury (SOI) of the spleen and liver, and applicable to the kidneys, has been validated. Resource utilization in terms of Intensive Care Unit (ICU) stay, however, remains unknown. This study investigates ICU utilization amongst pediatric trauma patients with blunt isolated low-grade solid organ injuries (IL-SOI) to the abdomen.

Methods: The National Trauma Databank (2007-2012) was queried for pediatric patients (<18y) with injuries to the spleen, liver, and kidneys. Injuries were graded utilizing the American Association for the Surgery of Trauma SOI scale, based on appropriate ICD-9 codes. Patients with a GCS<13, hypotension on presentation, or those requiring ventilator-support were excluded. Isolated low-grade (IL-SOI) was defined as grade-1 liver, splenic or renal injury with an Abbreviated Injury Scale (AIS) <3 for all other organ-systems. Descriptive-analysis was employed to determine patterns of hospital utilization.

Results: A total of 26,641 children were treated for SOI. 6,756 with IL-SOI were included. Average age was 12.3y(±4.7) with a male preponderance(70.4%). 30% of patients were admitted to the ICU (spleen,35.7%; liver,30.2%; kidneys,27.3%). 27.2% were treated at pediatric trauma-centers. 22.4% presenting to pediatric trauma-centers were admitted to the ICU compared to 32.7% presenting to adult trauma-centers ($p<0.05$). 56.2% stayed in the ICU for >1 day(54.0% for pediatric and 56.8% for adult centers, $p=0.310$). Median ICU length of stay (LOS) for pediatric trauma-centers was 1.5[IQR:1-2]days compared to 2[IQR:1-2]days for adult trauma-centers ($p=0.887$). Median LOS at pediatric trauma-centers was 2[IQR:2-3]days compared to 2[IQR:2-4] days for adult centers($p<0.488$).

Conclusions: Despite the lower acuity of IL-SOIs, a significant number of children are still admitted to the ICU with considerable resource utilization and cost. There is no difference in practice between adult and pediatric trauma-centers. Appropriate in-hospital triage to a regular floor may shorten LOS and help prevent unnecessary wastage of healthcare resources.

Poster Session II (cont.)

P28

POSTOPERATIVE COMPLICATIONS FOR CHILDREN UNDERGOING PRIMARY MALIGNANT LIVER TUMOR RESECTION

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Purpose: To evaluate predictive factors for post-operative complications in patients undergoing primary malignant liver tumor resection.

Methods: After IRB approval, a retrospective review of patients under 18 years-old who underwent liver resection for primary hepatic malignancy was performed from 2001 to 2016 at a single institution. Exclusion criteria were benign lesions and liver transplant. Post-operative complications were classified using the Clavien-Dindo scale (Table 1). Major complications were level 3 and above. Analysis was carried out in STATA13.

Results: Forty-six children underwent surgical resection of malignant liver pathology including hepatoblastoma (n=37), hepatocellular carcinoma (n=2), undifferentiated embryonal sarcoma (n=4), rhabdoid tumor (n=1), B-cell lymphoma (n=1) and angiosarcoma (n=1). The most common malignancy treated was hepatoblastoma. Only two intra-operative complications occurred including arrythmia and a vena cava injury. Thirty-three percent of patients had no postoperative complication, 19% had Clavien-Dindo grade 1 complication, 31.25% had grade 2, 7% had grade 3, 2% had grade 4, and 4% had grade 5 (Table 1). Six patients (12.5%) had a major complication (grade $\geq$3) from surgery, which included bile leak, biliary obstruction, small bowel obstruction, and death. The patients with major complications were found to be significantly older in age (mean age, 1950 vs 680 days, p=0.0232). The major complication rates were significantly different amongst operation type, with 0% complications (0/10) in those undergoing segementectomy, 12% (3/25) undergoing hemihepatectomy, and 23% (3/13) undergoing trisectionectomy group (p=0.023). Interestingly, the two patients that died within 30 days of surgery expired from sepsis related complications and both had hepatoblastoma with small cell undifferentiated component.

Conclusions: Older age and more extensive liver resection were significantly associated with major post-operative complications.

Poster Session II (cont.)

Table 1: Clavien-Dindo Grade of Complications

Clavien-Dindo Grade	Definition	Number of Patients	Percentage of Patients
Grade 0	No complication	16	33.33%
Grade 1	Deviation from normalpostoperativecourse without need for pharmacological intervention. Examples: fever, electrolyte disturbance, wound infection	9	18.75%
Grade 2	Requiring pharmacological treatment, blood transfusion, or parenteral nutrition	15	31.25%
Grade 3	Requiring surgical, endoscopic, or radiological intervention	4	8.33%
Grade 4	Life-threatening complication requiring ICU management	1	2.17%
Grade 5	Death	2	4.17%

Poster Session II (cont.)

P29

STAPLED INTESTINAL ANASTOMOSIS WITH ENDOSCOPIC STAPLERS IN PREMATURE INFANTS

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Purpose: The safety and effectiveness of a stapled intestinal anastomosis in adults, children, and infants is documented, in neonates it is not as well validated. We hypothesize that premature infants who received a stapled bowel anastomosis with endoscopic staplers have similar outcomes compared to patients with a hand-sewn anastomosis, when comparing anastomotic related complications.

Methods: IRB approval was obtained from our institution to perform a retrospective study involving all patients < 1 year old that underwent an intestinal anastomosis between June of 2012 and April of 2016. Patients greater than 36 weeks GA at birth or with a weight greater than 5 kg at surgery were excluded. Patient demographics, type of intestinal anastomosis, and anastomotic related complications within 3 months were collected. Chi-square tests were performed to examine the univariate association of intestinal anastomosis technique and complications. Logistic regression was performed examine the multivariable association between intestinal anastomosis technique and complications and to compute odds ratios.

Results: There were 71 cases of intestinal anastomosis in this cohort: 33 received a hand-sewn anastomosis and 38 received a stapled anastomosis. Groups were noted to have differences in age, weight, and diagnosis related to need for initial bowel resection. Age and weight were controlled for in multivariate analysis. Complications including leak and need for anastomotic revision were statistically insignificant. Reports of blood per rectum after surgery were greater in the stapled group (24% vs 6%, p = 0.0522), but this was ultimately statistically insignificant.

Conclusion: There were no significant differences in anastomotic complications when comparing the hand sewn and stapled intestinal anastomosis techniques in premature infants < 5 kg.

Poster Session II (cont.)

P30

A STRUCTURED BOWEL MANAGEMENT PROGRAM FOR PATIENTS WITH FUNCTIONAL CONSTIPATION CAN HELP DECREASE EMERGENCY DEPARTMENT VISITS, HOSPITAL ADMISSIONS AND HEALTHCARE COSTS

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Introduction: Published health care costs related to constipation in children in the USA are estimated at $3.9 billion/year, including visits to the Emergency department, unplanned hospital admissions, and visits to pediatricians and gastroenterologists. An organized bowel management program has been shown to provide a structured approach to manage patients with chronic constipation, and we sought to objectively assess its impact.

Methods: At two collaborating Centers, the Bowel Management Program (BMP) consists of an outpatient week which implements a treatment plan followed by objective assessment of stool burden with a daily abdominal radiograph. We reviewed all patients with functional constipation that participated in this program from 03/2011-06/2015 in center 1 and 04/2014-04/2016 in center 2. ED visits, hospital admissions, in addition to constipation related morbidities (abdominal pain, fecal impaction, urinary retention, and UTIs) were recorded 12 months prior to treatment and in the 12 month period following completion of the BMP. Patients with a history of ARM, HD, or abdominal surgery were excluded.

Results: In 154 patients, 39 (25%) had at least 1 unplanned visit to the hospital prior to treatment. In the 12 months following enrollment, ED visitations decreased to 16 patients, a 59% reduction ($p < 0.0005$). For unplanned hospital admissions, the rate decreased from 31 to 13, a 58% reduction ($p<0.0005$). This translated into a reduced cost for unplanned health care by at least 23% in one year. Constipation related symptoms improved in all cases.

Conclusion: In children with severe functional constipation, a structured bowel management program can lead to a decrease in unplanned visits to the emergency department, hospital admissions, and costs for constipation-related health care. This study shows that a bowel management program (which of course has infrastructure and personnel needs to set up) leads to improved care and dramatically reduced costs, and is thus a cost-effective and worthwhile investment.

Poster Session II (cont.)

P31

VARIATIONS IN MANAGEMENT OF HIRSCHSPRUNG DISEASE: APSA SURVEY RESULTS

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Purpose: Understanding variation in management of Hirschsprung's Disease(HD) can help standardize care and potentially mitigate patient morbidity.

Methods: With IRB approval(HUM00096954), an online survey using clinical scenarios, multiple-choice and open-ended questions, was conducted to determine practice patterns for initial diagnosis, surgical approach, and treatment of HD. Location and type of practice, case volume and experience of surgeon, and patient factors were assessed as factors contributing to variability. Categorical survey responses were assessed via Chi-square and Fisher's exact tests and comparisons of means via ANOVA.

Results: Of 340/1302(26%) who opened, 297(87%) completed the survey. Initial management and preferred approach varied significantly with years since training and region(Table 1), but not patient comorbidities($p>0.05$). Surgical technique[Soave(71%), Duhamel(24%), Swenson(3%)] varied significantly with years since training and region($p<0.05$). Post-operative management differed ($p <0.05$), with the majority using dilations(58%) or no prophylaxis(35%). Antibiotics used for enterocolitis varied significantly ($p<0.05$), with majority(36%) using metronidazole.

Conclusions: Variability in management of HD is explained by surgeon experience and practice location instead of patient factors. National guidelines may help standardize care of this uncommon disease.

Table 1

Initial Management		
Primary Pull-through	64%	years since training (p=0.002)
Initial Washouts	30%	region of practice (p=0.001)
Leveling Colostomy	6%	comorbidity (IVH,syndromic) (p>0.05)
Preferred Approach		
Laparoscopy	63%	years since training (p<0.001)
Laparotomy	10%	region of practice (p<0.05)
Trans-anal	27%	

Poster Session II (cont.)

P32

THE DIAGNOSTIC POTENTIAL OF MULTIPHOTON MICROSCOPY FOR SOLID TUMORS IN CHILDREN

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Background: Prognosis of solid tumors in children depend heavily on precise resection margins. So far, the extent of resection is based on macroscopic features, intraoperative biopsies, or palpatory feedback. Intraoperative frozen section biopsies are less accurate than permanent stains and prolong the operation due to their processing time. Multiphoton Microscopy (MPM) is a novel, real time imaging technique that allows imaging of live tissue up to 1mm in depth. It may be useful for intraoperative intraoperative diagnostics and the determination of clear margins. Realtime imaging of tissue could provide immediate feedback to the surgeon on resection margins. So far, however, it is unknown if pediatric solid tumors can be imaged accurately by MPM.

Methods: In a variety of pediatric solid tumors, we prepared tissue slides of the same resected tissue for conventional microscopy and MPM. We also performed imaging using MPM directly through the capsule. Both imaging modalities were compared via an independent Pathologist. The visibility of typical histologic criteria for the specific tumors were graded and compared.

Results: Side-by-side qualitative comparisons were performed on ganglioneuroma (GN), pleuropulmonary blastoma (PPB), hepatocellular carcinoma (HCC), adrenal adenoma (AA) and nephroblastoma (NB). Comparison for the tumor-specific findings are seen in table 1. Overall, there was excellent congruency of conventional light microscopy and MPM.

Conclusion: Diagnostic capabilities of MPM in the diagnostics of solid pediatric tumors is comparable or superior to conventional methods. It is capable of visualizing the tumor-typical features both on sectional specimens and through the tumor's capsule. Before MPM can be applied in the clinical setting, however, further standardization of the imaging parameters is necessary.

Poster Session II (cont.)

Comparison of conventional light microscopy and MPM in detecting tumor features

Tumor	Features	Lightmicroscopy	MPM
GN	- Cells in different stages - Nests of neuroblasts	+++ +	+++ ++
PPB	- Cells lack cytoplasm - Nucleus round/ovoid - Nucleus hyperchromatic - Prominent fibrovascular septum	+++ +++ ++ +	+++ +++ + ++
HCC	- Trabecular formations - Pleomorph, cells - Unsahped nucleus	+++ ++ +	+++ +++ ++
AA	- Spongiocytes - Pseudocapsule - Clear intercellular margins	+++ ++ ++	++ +++ +++
NB	- Unordered tubules - Epithelial component - Solid tumor cell accumulations - Mesenchymal differentiation	+++ +++ +++ ++	+++ ++ +++ ++

Poster Session II (cont.)

P33

VARIABILITY IN PEDIATRIC BLUNT ABDOMINAL TRAUMA EVALUATION

Adam M. Vogel, MD[1], Jingwen Zhang, MS[2], Patrick D. Mauldin, PhD[2], Regan F. Williams, MD[3], Eunice Y. Huang, MD, MS[3], Matthew T. Santore, MD[4], Kuojen Tsao, MD[5], Richard A. Falcone, MD, MPH[6], M Sidney Dassinger, MD[7], Jeffrey H. Haynes, MD[8], Martin L. Blakely, MD, MS[9], Robert T. Russell, MD, MPH[10], Bindi J. Naik-Mathuria, MD, MPH[1], Shawn D. St Peter, MD, MPH[11], David Mooney, MD, MPH[12], Jeffrey S. Upperman, MD[13], Christian J. Streck, MD[2].

[1]Texas Children's Hospital, Houston, TX, USA, [2]Medical University of South Carolina, Charleston, SC, USA, [3]University of Tennessee Health Science Center at Memphis, Memphis, TN, USA, [4]Emory University School of Medicine, Atlanta, GA, USA, [5]University of Texas Health Science Center at Houston, Houston, TX, USA, [6]Cincinnati Children's Hospital, Cincinnati, OH, USA, [7]Arkansas Children's Hospital, Little Rock, AR, USA, [8]Virginia Commonwealth University, Richmond, VA, USA, [9]Vanderbilt University School of Medicine, Nashville, TN, USA, [10]University of Alabama Birmingham School of Medicine, Birmingham, AL, USA, [11]Children's Mercy Kansas City, Kansas City, MO, USA, [12]Boston Children's Hospital, Boston, MA, USA, [13]Children's Hospital Los Angeles, Los Angeles, CA, USA.

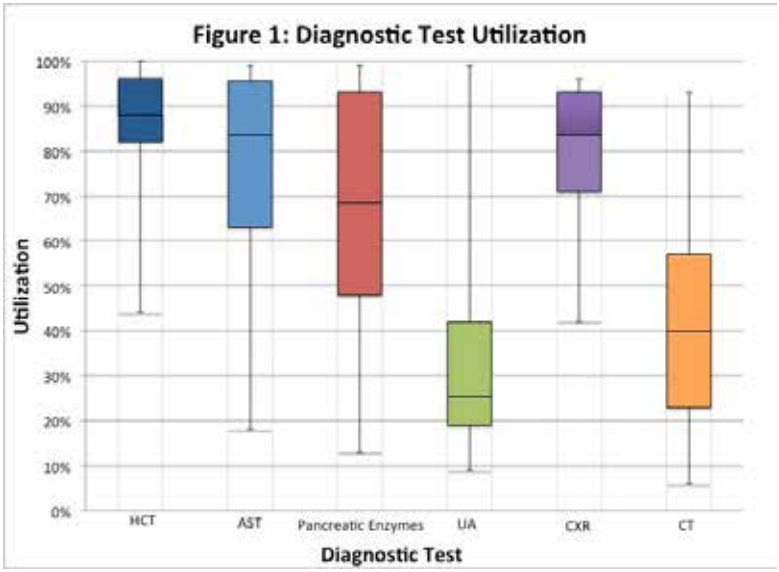
Purpose: The purpose of this study is to describe the practice pattern for routine laboratory and imaging assessment of pediatric patients following blunt abdominal trauma (BAT). We hypothesize that variability exists among pediatric trauma centers in the evaluation of BAT.

Methods: Pediatric patients (age<16 years) who presented following BAT to 14 Level-One Pediatric Trauma Centers over a one-year period were prospectively identified. IRB approval was obtained at all institutions. Injury, demographic, routine laboratory (hematocrit, AST, pancreatic enzymes, urine analysis) and imaging utilization data (chest radiograph and computed tomography) were collected. Utilization was defined as percent of patients receiving the test by center. For each test, centers were classified as high or low users based on their position above or below the mean for each test. Descriptive statistics and correlation analysis was performed; $p<0.05$ was considered significant.

Results: 2188 children with a median age of 8 [4,12] years were included. The median number of patients per institution was 120 [101,200]. Across centers, the median number of level-one activations was 19% [12,60], the median injury severity score was 5 [1,10], and the most prevalent mechanism of injury was motor vehicle collisions (46.4%, range: 16.7%-67.5%). There were significant differences in activation status, injury severity, and mechanism across centers; however, there was no correlation of level of activation, injury severity, or severe mechanism with diagnostic test utilization. Routine laboratory and imaging utilization can be seen in figure1. Among centers, there was no correlation between laboratory utilization and computed tomography use. Additionally, there was no correlation between centers that were high or low frequency laboratory utilizers with abdominal computed tomography utilization.

Conclusions: We conclude that wide variability exists in the routine initial laboratory and imaging assessment in pediatric patients following blunt abdominal trauma. This represents an opportunity for quality improvement and to improve resource utilization.

Poster Session II (cont.)



Poster Session II (cont.)

P34

AVALON CATHETERS IN PEDIATRIC PATIENTS REQUIRING ECMO: PLACEMENT AND MIGRATION ISSUES

Joseph T. Church, MD, Samir K. Gadepalli, MD, Ronald B. Hirschl, MD, George B. Mychaliska, MD, Marcus D. Jarboe, MD.

University of Michigan, Ann Arbor, MI, USA.

Tweet about it: @JoeChurch20-Fluoroscopy decreases the need for Avalon repositioning.

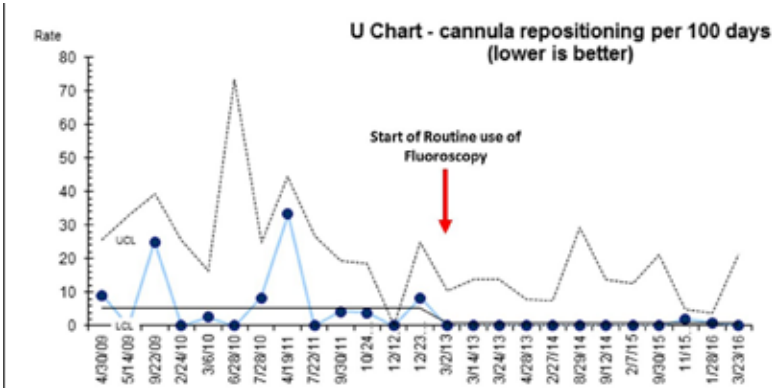
Purpose: The Avalon dual-lumen veno-venous catheter has several advantages, but the placement technique and management have not been adequately addressed in the pediatric population. We assessed our institutional outcomes and complications using the Avalon catheter in the pediatric population.

Methods: We retrospectively reviewed all pediatric patients who had Avalon catheters placed for respiratory failure at our institution from April 2009 to March 2016. Patients with congenital heart disease were excluded. All patients were managed using our standard ECMO protocol and cannula position was followed by daily chest x-ray and intermittent echocardiography (ECHO). Data collected included demographics, diagnosis, PRISM3 scores, ECMO run length, complications, and survival. The primary outcome was the need for catheter repositioning.

Results: Twenty-five patients were included, with mean age 8.3±6.9 years and duration of ECMO support 15±22 days. Overall survival was 68% (17/25) and mean PRISM predicted mortality was 16%±26% (range 0.3 to 95.9). All patients had the primary diagnoses of respiratory failure, with secondary diagnoses including sepsis (24%), ARDS (44%), and pneumonia (68%). All catheter insertions were performed percutaneously using ultrasound guidance; 14 patients (56%) underwent placement with fluoroscopic guidance as well. After April 2013, due to standardization of practice, 9/9 placements used fluoroscopy and 8/9 utilized both fluoroscopy and ECHO. Overall, thirteen patients (52%) had problems with cannula malposition leading to inadequate flow, re-circulation, and pericardial effusions; 8 of these (62%) required cannula repositioning. Three of 14 (21%) cannulas placed with fluoroscopy went on to require repositioning, compared to 7/11 (64%) placed without fluoroscopy (p=0.05). The decrease in cannula repositioning after practice change is reflected in the U-chart of cannula repositioning per 100 days (**Figure 1**).

Conclusions: Complications are common with the Avalon catheter in the pediatric population. Safe access requires ultrasound guided percutaneous access, fluoroscopic imaging, and ECHO. Our rate of malposition dramatically decreased after adopting this practice.

Poster Session II (cont.)



Poster Session II (cont.)

P35

TESTICULAR TUMORS IN PREPUBESCENT PATIENTS

Ilan I. Maizlin, MD[1], Kenneth W. Gow, MD[2], Adam Goldin, MD[2], Mehul V. Raval, MD[3], Melanie Goldfarb, MD[4], Monica Langer, MD[5], Jed G. Nuchtern, MD[6], Sanjeev A. Vasudevan, MD[6], John J. Doski, MD[7], Elizabeth A. Beierle, MD[1].

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Background: Pediatric testicular tumors are fundamentally distinct from their adult counterparts. Single-institution studies published to date have been limited in scope and number of patients. We utilized the National Cancer Data Base (NCDB) to describe the histological and clinical pattern of prepubescent testicular tumors.

Methods: Descriptive study of all prepubescent patients (≤12 yo) with testicular neoplasm in the NCDB (1998-2012) was performed. Patient demographics, tumor histology and characteristics, treatment modalities, and outcomes were abstracted.

Results: A total of 479 patients were identified, with a mean age of 2.7 (IQR 0-4) years at diagnosis. 67% of cases were diagnosed by 3 years of age. Caucasians comprised 79.5%(381) of patients, while 8.6%(41) were black and 6.5%(33) were Asian. Yolk sac tumors were the most common histology (202 patients,42.2%), followed by rhabdomyosarcomas (130 patients,27.1%), teratomas (83 patients,17.3%), and seminomatous germ-cell tumors (46 patients,9.6%). Eleven of the tumors (2.3%) were diagnosed at Stage 0; 249 patients (52.0%), 90 patients (18.8%) and 16 patients (3.3%) were diagnosed at Stages I, II and III, respectively. Surgical resection was performed in 465 boys. 20.2%(94) of the procedures were organ-sparing and 79.8%(371) were non-sparing. Chemotherapy was utilized in 27.8%(133) of cases and radiotherapy in 6.9%(33). With mean follow-up of 5.6 years, mortality rate was 3.1%. Variables were further stratified according to histological type (Table 1).

Conclusions: To our knowledge, this series of prepubertal testicular tumors is the largest yet reported. The data demonstrate differences in both histology and progression from adult equivalents. Most common neoplasm was yolk cell tumor, but it was usually diagnosed in early stages, allowing for low mortality rates.

Poster Session II (cont.)

Table 1: Demographic, tumor and treatment characteristics based on tumor histology.

	Yolk Sac Tumor n=202	Rhabdomyo-sarcoma n=130	Teratoma n=83	Seminomatous Germ Cell n=46	Other n=18	Total
Mean Age (years)	1.16	5.40	1.61	3.78	4.11	2.7
Overall Stage						
0	3 (1.5%)	0 (0.0%)	0 (0.0%)	7 (15.2%)	1 (5.6%)	11 (2.3%)
I	126 (62.4%)	60 (46.2%)	40 (48.2%)	17 (37.0%)	6 (33.3%)	249(52.0%)
II	3 (1.5%)	70 (53.8%)	3 (3.6%)	3 (6.5%)	11 (61.1%)	90 (18.8%)
III	11 (5.4%)	0 (0.0%)	2 (2.4%)	3 (6.5%)	0 (0.0%)	16 (3.3%)
Unknown	59 (29.2%)	0 (0.0%)	36 (45.8%)	16 (34.8%)	0 (0.0%)	113(23.6%)
N-Stage						
N0	101 (50.0%)	*Node status evaluation is not required in staging of sarcoma neoplasm*	26 (31.3%)	22 (47.8%)	14 (77.8%)	101 (35.3%)
N1	1 (0.5%)		2 (2.4%)	2 (4.3%)	0 (0.0%)	5 (1.7%)
N2	0 (0.0%)		0 (0.0%)	1 (2.2%)	0 (0.0%)	1 (0.3%)
N3	0 (0.0%)		1 (1.2%)	0 (0.0%)	0 (0.0%)	1 (0.3%)
NX	100 (49.5%)		54 (30.2%)	21 (45.7%)	4 (22.2%)	179 (62.4%)
Surgery						
None	4 (2.0%)	3 (2.3%)	0 (0.0%)	2 (4.3%)	1 (5.6%)	10 (2.1%)
Organ-Sparing	30 (14.9%)	30 (23.4%)	10 (23.2%)	9 (19.6%)	6 (33.3%)	94 (19.8%)
Non-Sparing	167 (83.1%)	95 (74.2%)	63 (76.8%)	35 (76.1%)	11 (61.1%)	371 (78.1%)
Chemotherapy						
Yes	17 (8.4%)	34 (26.2%)	7 (8.4%)	12 (26.1%)	3 (16.7%)	133 (27.8%)
No	178 (88.1%)	94 (72.3%)	76 (91.6%)	34 (73.9%)	15 (83.3%)	337 (70.4%)
Unknown	7 (3.5%)	2 (1.5%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	9 (1.9%)
Radiation						
Yes	0 (0.0%)	27 (20.8%)	0 (0.0%)	4 (8.7%)	2 (11.1%)	33 (6.9%)
No	195 (96.5%)	100 (76.9%)	82 (98.8%)	42 (91.3%)	16 (88.9%)	435 (90.8%)
Unknown	7 (3.5%)	3 (2.3%)	1 (1.2%)	0 (0.0%)	0 (0.0%)	11 (2.3%)
Vital Status						
Alive	190 (97.9%)	121 (96.8%)	79 (97.5%)	40 (93.0%)	16 (88.9%)	446 (96.7%)
Dead	4 (2.1%)	4 (3.2%)	2 (2.5%)	3 (7.0%)	2 (11.1%)	15 (3.1%)

Poster Session II (cont.)

P36

REGIONAL VARIATION IN CANCER RELATED MORTALITY IN PEDIATRIC SOLID TUMORS

Michael P. La Quaglia, MD, **James Saltsman, MD**, Todd E. Heaton, MD, MPH, Anne Stey, MD.

Memorial Sloan Kettering Cancer Center, New York, NY, USA.

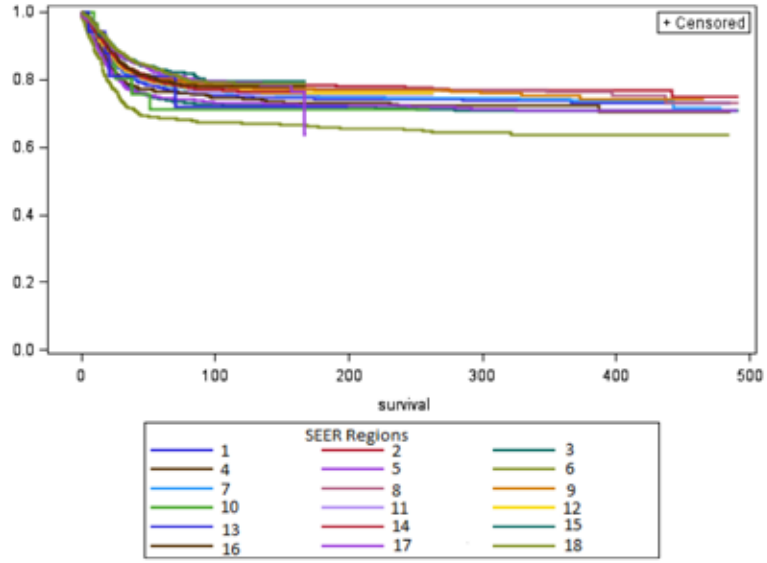
Purpose: The aim of this study was to establish whether cancer related mortality in solid pediatric tumors demonstrated regional variation.

Methods: Patients were identified using the SEER database from 1977-2013 patients with neuroblastoma, hepatoblastoma, Wilms, osteosarcoma, Ewing sarcoma, germ cell tumors and rhabdomyosarcoma. Survival analysis was used to model the relationship between region, with greater Atlanta as the reference, and cancer related mortality as the outcome variable. SEER regions were designated with numerical dummy identifiers.

Results: A total of 20,216 patients were identified; 3,668 neuroblastomas, 769 hepatoblastomas, 3,155 Wilms tumors, 2,565 osteosarcomas, 1,626 Ewings Sarcomas, 6,084 germ cell tumors, and 2,350 rhabdomyosarcomas. Treatment varied significantly among regions. Surgery among regions varied from 73.7%-86.9% ($p<0.0001$), and radiation from 21.7-33.2% ($p<0.0001$). Furthermore, cancer related mortality differed significantly among regions ($p<0.0001$)(Figure 1). Regional variation in cancer related mortality persisted despite controlling for age, stage, race, surgical treatment and radiation treatment and the year care was rendered. In multivariate analysis, 13 regions had cancer related mortality equivalent to greater Atlanta. In contrast, four other regions had significantly higher cancer related mortality; regions three Hazard Ratio (HR)=1.43, 95% Confidence Interval (CI)=1.18-1.73, $p<0.0002$, five HR=1.53, 95% CI=1.25-1.86, $p<0.0001$, six HR=1.86, 95% CI=1.49-2.31, $p<0.0001$, and seven HR=1.27, 95% CI=1.05-1.55, $p=0.02$.

Conclusions: There is significant regional variation in cancer related mortality in pediatric solid tumors. These data suggests there is an opportunity for further standardization of care to reduce regional variation in cancer related mortality.

Poster Session II (cont.)



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Thursday, May 4 at 3:00 p.m. though Saturday, May 6 at 10:00 a.m.
There are no oral presentations for these posters.

P37

ULTRASOUND-GUIDED GASTROSTOMY TUBE PLACEMENT: A CASE SERIES

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University of Michigan, Ann Arbor, MI, USA.

Purpose: Gastrostomy tubes (G-tubes) can be placed with a variety of techniques. Here we report a case series of a novel method, ultrasound-guided G-tube placement (USGTP).

Methods: After IRB approval (HUM00117537), all cases of USGTP at our institution from September 2015-August 2016 were retrospectively reviewed. Data collected included demographics, operative time, complications, time to first feeding, and 30-day readmissions. The steps of the procedure, all performed under direct ultrasound visualization, are as follows: A C10-3 curved-phased array probe (Zonare) is used to delineate upper abdominal anatomy. The stomach is distended with saline via a nasogastric tube. Three T-fasteners are placed into the stomach below the costal margin. An 18G single wall puncture needle is used to access the stomach, through which a 0.035in. Amplatz wire is advanced. The tract is serially dilated to 16-18Fr. The tract length is measured and a 14Fr MIC-KEY button tube with a 7Fr dilator through the lumen is advanced over the wire into the stomach. The balloon is inflated, and wire and dilator are removed (**Figure1**).

Results: Twelve patients underwent USGTP. Median age at operation was 2.6yo (IQR 0.9-5.3) and median weight 9.9kg (IQR 7.2-18.4). Median operative time was 27min. (IQR 20-44). First feeding occurred 8.8±2.9hrs after the procedure. The second patient in the series experienced the only operative complication. In this case, a linear probe was used with insufficient gastric distension, which resulted in placement of the tube through a fold in the stomach wall. This was immediately recognized and remedied intra-operatively. This prompted successful technique modification for future USGTPs. Only one patient was readmitted within 30 days, and this was related to urinary retention, an underlying problem.

Conclusions: US-guided G-tube placement is safe and effective. Advantages include good anatomical delineation, a single incision, avoidance of endoscopy and initial placement of a button G-tube.

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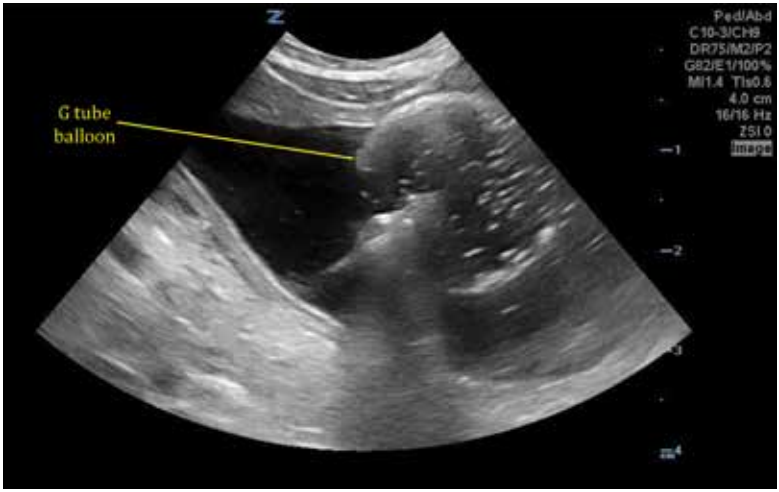

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P38

EFFECT OF RACE AND HISTOLOGY AT TIME OF PORTOENTEROSTOMY ON OUTCOMES FROM BILIARY ATRESIA

Jamie R. Robinson, MD[1], Jiancong Liang, MD[1], Patricia W. Costacurta, BS[2], Hernan Correa, MD[1], Lynette Gillis, MD[1], Harold N. Lovvorn III, MD[1].

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Tweet about it: Portoenterostomy for Biliary Atresia: African Americans have better outcomes after surgery and increasing age at time of surgery is associated with an increase in bile duct proliferation!

Purpose: Increasing age at time of portoenterostomy (Kasai procedure) for infants having biliary atresia (BA) has been associated with worse outcomes. We aim to determine if need for liver transplantation or mortality associate with other demographics, bile ductule proliferation (BDP) and hepatic fibrosis (HF) at time of portoenterostomy.

Methods: Retrospective review of all infants who underwent portoenterostomy for BA at a single children's hospital from 2002 to 2016. Demographics, laboratory parameters and outcomes were measured. Liver biopsy specimens from before or at time of portoenterostomy were scored based on total surface area of CK7 (marker of BDP) and trichrome (marker of HF) staining. Categorical outcomes were compared using Fisher exact test and continuous variables using linear regression or t-tests.

Results: 49 infants underwent portoenterostomy for BA during the study period (Table). 13/16 (81.3%) Black children survived with their native liver compared to 16/33 (48.5%) White children (p=0.03). All mortalities occurred among White children. 38% of Black and 6% of White children had Ohi type II BA (p=0.01). Mean area of CK7 staining was 3.1% among infants aged ≤ 60 days at time of portoenterostomy and 7.0% for > 60 days (p=0.03). Mean area of trichrome staining was 19.0% for infants aged ≤ 60 days and 26.3% for > 60 days at time of portoenterostomy. No significant outcomes differences were detected for age, steroid administration, BDP, HF, or Ohi classification.

Conclusion: At time of portoenterostomy for BA, increasing age is significantly associated with more BDP and relatively more advanced HF. Increasing BDP, HF, and White race may portend worse outcomes in infants undergoing portoenterostomy.

Demographics and Outcomes of Children Undergoing Portoenterostomy for Biliary Atresia 2002-2016

	Children with Biliary Atresia (n = 49)	**Survival with Native Liver (n=29) n (%)**	**Survival with liver transplant (n=14) n (%)**	**Mortality (n=6) n (%)**	**Median Length of Follow-up, years**
Age at Portoenterostomy, median (IQR)	59 days (41-66)	63 days (41-68)	60 days (49-72)	39 days (26-62)	4.0 - Overall
Male	25 (51%)	18 (62%)	6 (43%)	1 (17%)	5.0
Female	24 (49%)	11 (38%)	8 (57%)	5 (83%)	2.5
White	33 (67%)	16 (55%)	11 (79%)	6 (100%)	3.0
Black	16 (33%)	13 (45%)	3 (21%)	0 (0%)	5.0

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P39

ROUTINE VERSUS SELECTIVE PATCH METAL ALLERGY TESTING BEFORE THE NUSS PROCEDURE

Robert J. Obermeyer, MD[1], **Sheema Gaffar, MS**[2], Robert E. Kelly, Jr., MD[1], Michele L. Lombardo, MD[1], Frazier W. Frantz, MD[1], M. Ann Kuhn, MD[1], Margaret M. McGuire, MD[1], Michael J. Goretsky, MD[3], James F. Paulson, PhD[4], Cynthia S. Kelly, MD[1].

[1]Children's Hospital of The King's Daughters, Norfolk, VA, USA, [2]Eastern Virginia Medical School, Norfolk, VA, USA, [3]Carolinas Health Care System, Charlotte, NC, USA, [4]Old Dominion University, Norfolk, VA, USA.

Purpose: Determine the role of patch metal allergy testing to select bar material before the Nuss procedure.

Methods: We conducted an IRB-approved retrospective cohort study comparing two strategies to select bar material. In Cohort A (9/2004 - 1/2011), patients with a personal or family history of metal sensitivity had either patch testing to select bar material or titanium bar placement at the surgeon's discretion. The remaining patients were not tested and received stainless steel bars. In Cohort B (2/2011 - 6/2014), all patients who underwent patch testing to select bar material were included. The cohorts were compared for clinical outcomes. Risk factors for positive patch test were also investigated.

Results: In Cohort A, 9.9% (63 of 639 patients) were patch tested of which 41.3% (26 of 63) tested positive. In Cohort B, with routine patch testing, 20.2% (54 of 267 patients) tested positive. Both cohorts had a similar incidence of postoperative metal allergies (1.7% vs 1.5%, $p = 0.533$). Patients who were not patch tested preoperatively and developed a metal allergy postoperatively were found only in Cohort A (1.6% vs 0%, $p = 0.073$). Premature bar removal (0.5% vs 1.1%, $p = 0.369$) was infrequent in both cohorts and there were no recurrences of pectus excavatum (27 months follow-up). Personal history of metal sensitivity was predictive of a positive patch test (OR = 8.5, $p < 0.001$); personal history plus family history was more predictive (OR = 13.1, $p < 0.001$).

Conclusions: While our previous results led us to recommend routine patch testing before the Nuss procedure, our recent review suggests similar clinical outcomes using patch testing to select bar material or titanium bars in patients with a personal or family history of metal sensitivity. Patients with a personal or family history of metal sensitivity should be patch tested preoperatively.

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P40

ACHIEVING EXPERT CONSENSUS ON PRENATAL COUNSELING FOR CONGENITAL PULMONARY AIRWAY MALFORMATION AND CONGENITAL DIAPHRAGMATIC HERNIA USING THE DELPHI METHOD

Loren Berman, MD, MHS[1], Kristen Miller, DrPH, MSPH[2], Rebecca Kowalski[3], Jordan Jackson, MD[4], Francois Luks, MD, PhD[5].

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Purpose: Pediatric surgeons frequently offer prenatal consultation for congenital pulmonary airway malformation (CPAM) and congenital diaphragmatic hernia (CDH). Prenatal decisions may have an impact on postnatal outcomes, and surgeons play a critical role in this decision-making process. Currently there is no evidence-based consensus on how to offer prenatal counseling for these, and other, surgical conditions.

Methods: Areas of discrepancy and controversy in current perinatal management and outcomes literature for CPAM and CDH were identified. A two-round online Delphi Method survey was offered to 78 pediatric surgeons identified as experts in fetal counseling and intervention. After the first round, items that did not reach consensus were broken down into further questions based on participant feedback. The second round secured consensus from aggregated results and addressed disagreement. Consensus was defined as >80% agreement.

Results: Fifty-three surgeons (68%) responded to at least one of the two survey rounds, for a total of 78 responses. During round 1, consensus was reached on 54 of 89 survey questions (61%), and 45 new questions were developed. During round 2, consensus was reached on 53 of 60 survey questions (88%). The remaining 7 questions were close to a 50-50 split, suggesting that either option is equally acceptable. Topics that reached consensus include frequency of prenatal imaging, stratification of severity, when to refer to fetal treatment center, delivery plan, indications for prenatal intervention, postnatal management, and content discussed during prenatal consultation.

Conclusions: We determined expert consensus using an anonymous Delphi Method in order to establish guidelines regarding perinatal management and counseling for CPAM and CDH. The results of this work can be used to create educational resources for pediatric surgeons and surgeons-in-training who will be participating in perinatal care of these patients. This methodology should be applied to other areas in pediatric surgery where there is lack of evidence-based consensus.

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P41

MALIGNANT TUMORS MISDIAGNOSED AS BENIGN VASCULAR MALFORMATION

Federico Scorletti, MD, Adrienne Hammill, MD, PhD, Manish Patel, DO, Kiersten Ricci, MD, Roshni Dasgupta, MD, MPH.

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Background: Vascular tumors that present as malignancies are difficult to diagnose in children and are often initially thought to be benign vascular malformations. Management differs drastically and delays in diagnosis may impact overall survival.

Purpose: To predict qualities that may increase the index of suspicion of malignancy in patients presenting with vascular anomalies.

Methods: A retrospective review was performed to identify patients between 2006 and 2016 with an initial diagnosis of a benign vascular malformation, which on further work up was noted to be a malignancy. Demographics, clinical presentation, laboratory and radiologic studies were analyzed.

Results: 11 patients were identified with the mean age at presentation was 3.7 years (1 d to 23 years). Diagnosis included subtypes of sarcoma (9), neuroblastoma, and malignant peripheral nerve sheath tumor. Time to diagnosis of a malignancy after presentation was a mean of 9 months (7 days to 4 years). The timing of diagnosis was not associated to patient demographics-age, gender, race or insurance status. 9/11 lesions had rapid growth which prompted biopsy. In 4 of these patients, major surgical interventions were required including extremity amputations and hepatic resection. Pain was an inconsistent finding, present in only 36% of patients. Hematologic markers were positive for malignancy in only 1 case. Imaging studies showed no pathognomonic signs and only 2 radiologic reports suggested biopsy. Median follow up was 14 months (1-48 months). 8 patients currently have no evidence of disease and 3 patients have died of disease.

Conclusions: Although malignant vascular tumors are rare, a clear index of suspicion needs to be maintained particularly with rapid growth or increasing symptoms. Differentiation of malignant tumor from benign lesions relies on the comprehensive evaluation of clinical manifestations and evolution of the lesion. Physicians should have a low threshold for biopsy for the diagnosis of unclear vascular lesions.

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P42

SUTURELESS CLOSURE OF GASTROSCHISIS REDUCES OPERATING ROOM USE, GENERAL ANESTHESIA AND VENTILATOR DAYS

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Purpose: Case series have demonstrated sutureless closures to be safe and cosmetically appealing for the correction of gastroschisis. We hypothesize that sutureless closure maintains equivalent clinical outcomes while reducing operative room use, need for general anesthesia and ventilator days, thereby reducing total hospital charges.

Methods: We conducted a retrospective case control study of infants who underwent gastroschisis repair at our institution from January 2011 to August 2016. Patient factors, clinical outcomes and median total hospital charges were compared between sutureless closure (n=9) and primary fascial repair (n=27) in an intention to treat analysis. Student t-test was used for continuous variables and Chi-Squared for categorical variables. Median hospital charges and length of stay were compared using Wilcoxon Rank Sum Test. A p-value of 0.05 was considered significant.

Results: Patient characteristics were equivalent. Operating room use was significantly reduced (0.44 vs. 1.0; $p < 0.001$) in the sutureless group. Proportion of patients requiring general anesthesia (0.44 vs. 0.93; $p = 0.002$) as well as ventilator days (1.11 vs. 6.56 days; $p = 0.038$) were similarly reduced. Return of bowel function, surgical site infections, length of stay and death were equivalent. Hospital charges were 21,171 less in sutureless group but were not statistically significant (223,588 vs. 244,759 dollars; $p = 0.265$).

Conclusion: We conclude that sutureless closure reduces need for operative room use, general anesthesia and length of ventilator dependence. Hospital charges were 21,000 dollars less in sutureless repair, but did not reach statistical significance. Given the economic climate and concerns of effects of general anesthesia on the developing neonatal brain, sutureless closure of gastroschisis should be considered.

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Table 1: Clinical Outcomes (Results are mean or median value, Standard Deviation in Parenthesis)			
	Sutureless Repair (n = 9)	**Fascial Repair (n = 27)**	
First Consistent Bowel Movement (Days)	13.78 (7.26)	17.44 (13.02)	p = 0.43 (p = 0.37)
Time to 100% Enteral Feeds (Days)	34.33 (22.52)	34.7 (16.72)	p = 0.34 (p = 0.16)
Infection	0	3	p = 0.29 (p = 0.43)
Death	1	3	p = 1.0 (p = 0.43)
Time on Ventilator (Days)	1.11 (0.538)	6.56 (1.43)	p = 0.038* (p = 0.002)*
Percentage Requiring General Anesthesia	0.44	0.93	p = 0.002* (p < 0.001)*
Percentage Requiring Operating Room	0.44	1.0	P < 0.001* (p < 0.001)*
Median Length of Hospitalization (Days)	27 (21.09)	37 (16.47)	p = 0.82 (p = 0.10)
Median Hospital Charges(US Dollars)	223,588 (14,5487)	244,759 +/- 183066	p = 0.265 (p = 0.156)

First P-value from t-test, chi2 or Wilcoxon Rank-Sum for all patients in study including patients presenting with atresia or bowel perforation. Second P-value, in parenthesis, represents same statistical comparison excluding patients with complex abdominal pathology for sensitivity analysis. Statistical significance denoted by asterisk

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P43

COMPARISON OF EARLY VERSUS DELAYED STRATEGIES FOR REPAIR OF CDH ON ECMO

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Purpose: For the last seven years, our institution has repaired infants with CDH that require ECMO early after cannulation. Prior to that, we attempted to decannulate before repair but repaired on ECMO if we were unable to wean after two weeks. This study compares those two strategies.

Methods: From 3/2002 to 5/2016, 68 infants with CDH required ECMO at our institution. 44 (64.7%) were repaired on ECMO and 18 (26.5%) were repaired after decannulation. Data were collected retrospectively and compared between patients repaired ≤5 days after cannulation ("early", n=33) and >5 days after cannulation or after de-cannulation ("late", n=29). Stepwise Cox multivariate regression analyses were performed, considering EGA, birth weight, APGARs, prenatal diagnosis, defect size/side, liver position, repair type, severe cardiac defects, and pressor requirement.

Results: Patients in the late group were more frequently on inotropes/pressors at the time of repair (early=25%, late=67.9%, p=0.002) and more commonly had liver up (early=60.6%, late=86.2%, p=0.044). Survival for the early and late groups was 48.3% and 62.5%, respectively (p=0.049). For patients that were successfully decannulated prior to repair, survival was 94.4% (17/18). There was no difference in reoperation for bleeding between groups (early=24.1%, late=9.38%, p=0.17), but all bleeding occurred in patients repaired on ECMO (22.7%, 10/44). Moreover, early repair was associated with a prolongation of ECMO (early=20.1, late=12.2 days, p=0.0049). No differences were observed between groups for ICH (p=0.32), days on the ventilator (p=0.75), or hospital LOS (p=0.24). After multivariate regression, early repair was an independent predictor of both mortality (HR=4.25, 95% CI=1.42-12.72, p=0.009) and days on ECMO (RR=1.91, 95% CI=1.44-2.53, p<0.0001).

Conclusions: Our data suggest that CDH repair early after ECMO cannulation may be associated with increased mortality and prolongation of ECMO. Selection bias between groups is reduced since timing of repair was largely based on institutional protocols that were changed during the study period.

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P44

IN-CONTINUITY DISTRACTION ENTEROGENESIS WITH THREE-DIMENSIONALLY PRINTED SPRING

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Purpose: Spring-mediated distraction enterogenesis has been investigated as a potential treatment for patients with short bowel syndrome. Springs placed in intestinal continuity have demonstrated potential for clinical applicability but are limited by complicated suture anchors for intestinal attachment. Here we show the feasibility of in-continuity distraction enterogenesis using a novel design of three-dimensionally printed springs.

Methods: Juvenile mini-Yucatan pigs underwent laparotomy for in-continuity placement of a three-dimensionally printed spring with bidirectional surface features within the jejunum (Figure). No additional sutures were used for anchoring. Springs with smooth surfaces were used as controls. Spring location was evaluated weekly by abdominal radiographs. Intestines were examined directly for length and presence of spring at 2 weeks.

Results: Smooth-surface springs passed through the intestine readily without intestinal lengthening. Spring with bidirectional surface features stayed attached but could be easily removed at specimen retrieval. There were no signs of perforation of the in-continuity jejunum, which demonstrated 40% intestinal lengthening. Histologically, the lengthened jejunum showed significantly increased crypt depth and muscularis thickness in comparison to normal jejunum.

Conclusion: This novel three-dimensionally printed spring with bidirectional surface features allowed temporary intestinal adherence and promoted in-continuity intestinal lengthening. This approach shows the potential for a completely endoluminal distraction enterogenesis device that can be delivered via a stoma or natural orifice. A degradable device will obviate the need for its removal in the future.

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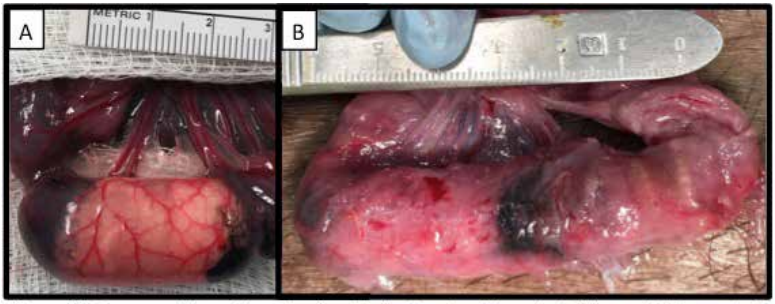

Figure. (A) Compressed three-dimensionally printed spring placed in-continuity jejunum. (B) Segment of jejunum following in-continuity spring lengthening at 2 weeks. The ends of the spring are marked with India ink to evaluate intestinal length at time of specimen retrieval.

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P45

USE OF AN ACCELERATED PATHWAY AMONG PATIENTS UNDERGOING POSTERIOR SAGITTAL ANORECTOPLASTY

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Purpose: Posterior sagittal anorectoplasty (PSARP) can be performed without a protective colostomy, but there is debate regarding duration of antibiotics and time to oral intake in these primary PSARP patients. The aim of this study was to evaluate the safety and costs associated with primary PSARP performed with an accelerated standardization of postoperative care.

Methods: Patients who underwent PSARP at our institution from 2004 to 2016 were identified within a prospectively maintained data repository. Patients were stratified by receipt of protective colostomy and admission to NICU ("newborns"). Outcomes included postoperative complications, postoperative length of stay (LOS), time to oral feedings, and hospitalization costs.

Results: Among 63 patients undergoing PSARP, the majority of newborns (n=17) underwent primary PSARP (82.4%), while the majority of non-newborns (n=46) did not (37.0%). Among newborns, patients undergoing primary PSARP compared to those with stomas were similar regarding age, sex, or the presence of low- versus high or intermediate malformations. There were also no significant differences regarding antibiotic duration (2 versus 2, p=0.933), time to oral feedings (2 versus 1, p=0.272), postoperative LOS (4.5 versus 7 days, p=0.556), or costs ($22,486 versus $30,231, p=0.102). Non-newborns undergoing primary PSARP were more often female and with low malformations than patients who received stomas, but did not differ regarding age. There were also no significant differences regarding antibiotic duration (2 versus 2, p=0.242), oral feedings (2 versus 2, p=0.272), postoperative LOS (2 versus 2 days, p=0.791), or costs ($11,176 versus $7,694, p=0.357). Importantly, among both newborn and non-newborn populations, postoperative complications were not significantly increased among primary PSARP patients.

Conclusion: Patients undergoing PSARP without diverting stoma did not experience worsened postoperative outcomes despite similar duration of antibiotic therapy and time to oral feedings, suggesting that the accelerated pathway for one-stage procedures may be beneficial in appropriately selected patients.

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UTILIZING TRAUMA VIDEO REVIEW (TVR) TO IMPROVE & ASSESS CLOSED-LOOP COMMUNICATION IN PEDIATRIC TRAUMA

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Purpose: Trauma care is multidisciplinary and time-sensitive in nature, making the effects of good communication more pronounced. TeamSTEPPS has been promoted in healthcare with a strong focus on communication. We hypothesized that closed-loop communication would improve time to task completion in pediatric trauma activations.

Methods: Using video review of trauma activations, from an ACS verified level I pediatric trauma center during January 2016 to September 2016, we identified orders articulated by the team leader. We evaluated order audibility, directed responsibility, check back and time to completion. Closed-loop orders were defined as having all three variables. We also looked at the effect of pre-notification and level of activation. Data was analyzed using SAS version 9.4 (SAS Institute Inc., Cary, NC).

Results: In total, 89 trauma activation videos were reviewed, with 387 verbal commands. Of those, 126 (32.6%) were directed, 372 (96.1%) were audible, and 101 (26.1%) were closed-loop. On average each order required 3.85 minutes to be completed. There was a significant difference in time-to-task-completion with respect to closed-loop (Y vs. N) ($p<0.0001$). Those subjects with a closed-loop were 3.6 times more likely to complete the task sooner as compared to subjects with an open-loop [HR=3.6 (95% CI: 2.5, 5.3)]. There was not a significant difference in the rate of closed-loops between pre-notification and no pre-notification (24.8% vs. 23.3% respectively, $p<0.7862$). There was not a significant difference in time-to-task-completion with respect to pre-notification vs. no pre-notification ($p<0.6100$). [HR=1.1 (95% CI: 0.9, 1.3)]. There was not a significant difference in time-to-task-completion with respect to the level of activation I vs. II ($p<0.2229$). [HR=1.3 (95% CI: 0.8, 2.1)].

Conclusions: Our study highlights for the first time the importance of closed loop communication in improving time-to-task-completion. We suggest that a standardized closed-loop communication system should be utilized by trauma team leaders.

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SIMULATION-BASED EDUCATION FOR ADVANCED PEDIATRIC MINIMALLY INVASIVE SURGERY: ENHANCING EXISTING TRAINING OPPORTUNITIES

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Purpose: Despite broad acceptance of minimally invasive surgical (MIS) techniques for neonatal conditions, pediatric surgical trainees continue to have limited exposure to advanced MIS skills. In an era of competency-based educational outcomes, an annual pediatric surgery advanced MIS skills course has sought to further meet trainees' needs for cognitive, technical and professional skills in MIS. In this work, we sought to further evaluate trainee self-reported proficiencies before and after an intensive 2-day course in advanced neonatal MIS.

Methods: IRB-approved retrospective review of global course evaluations for the 2016 advanced MIS skills course was performed. Thirty-four of 39 participants self-reported previous experience and current proficiency levels (Likert scale: novice=1, proficient=3, expert=5) with advanced endoscopic skills and procedures, including common bile duct exploration (CBDE), rigid bronchoscopy-airway foreign body, duodenal atresia repair (DA), diaphragmatic hernia repair (DH), pulmonary lobectomy, and tracheoesophageal fistula repair (TEF). Descriptive analyses were performed and compared to previous evaluations of the course.

Results: Participants reported proficiency in individual MIS technical skills (mean 2.91 ± 0.87) but had limited experience with advanced MIS procedures (mean case volume 1.56 ± 2.40). Self-reported proficiency for MIS TEF(18%), lobectomy(26%), DA(15%), choledochal cyst excision(18%), and CBDE(12%) were low. Reported proficiency was higher for MIS DH(35%) and Ladd procedure(50%). Interestingly, the majority of trainees had never participated in a prenatal consult for DA, TEF, DH, lung malformations, or choledochal cyst; yet 70% reported feeling comfortable providing independent consultation for these anomalies.

Conclusions: Despite advanced technical skills, pediatric surgical trainees continue to have limited experience in application of those skills for advanced MIS procedures. Self-reported ratings, similar to the Milestones framework, highlight the need for ongoing advanced MIS educational opportunities to complement existing training programs. Although not specific to MIS, the perceived comfort level with complicated prenatal consultations despite no previous experience warrants further investigation.

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P48

WHY WAIT?: INITIATION OF EARLY ENTERAL FEEDING AFTER PEDIATRIC GASTROSTOMY TUBE PLACEMENT

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Purpose: Gastrostomy(GT) placement is a common procedure in pediatric surgical practice. Early initiation of gastrostomy feedings may reduce associated hospital costs, but many surgeons fear complications could result from this practice. We hypothesized that patients starting feedings ≤6 hours following GT placement would not have a greater number of post-operative complications compared to those fed later.

Methods: An IRB-approved three-year retrospective review of GTs placed between January 2012-December 2014 at three academic institutions was undertaken. Data collected included indication, demographics, operative-time and type, narcotic use, time of initiation of post-operative feeding, and complications. Data was analyzed using Fisher's Exact test and student's t-test. $P < 0.05$ was significant.

Results: 1086 GTs were inserted (49.0% endoscopically, 44.6% laparoscopically, 6.4% open) for indications of failure-to-thrive(23.3%), feeding dysfunction(42.1%), congenital heart disease(7.1%), neurological disease(16.7%), renal failure(1.9%), metabolic disorder(2.3%), and other(6.2%). Mean operative-time was 53±51.7 minutes. Mean age at placement was 36 months; mean weight was 12.2±14.5 kg. Postoperatively, mean narcotic use was 5.7±4.5 doses with no significant differences between feeding groups. Hospital length of stay was significantly less in those fed prior to 6 hours (5.8±0.7d) compared to those who were fed greater than 6 hours post-operatively (18.9±1.7d, $p=0.05$). Early and late feeding groups had equivalent total complications, but those who had feeds initiated ≤ 6 hours postoperatively had higher rates of stoma site infections and vomiting within the initial 24 hours, while those fed >6 hours had higher rates of overall feeding intolerance and increased GT-related operative interventions.

Conclusions: Early initiation of feedings following gastrostomy placement is safe and may streamline hospital stays. However, risk of stoma site infection must be monitored closely.

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Table 1

Variable	Initiation of Feeds ≤ 6 hours after G-tube Placement		Initiation of Feeds > 6 hours after G-tube Placement		*p-value*
	Occurrence N (%)	No Occurrence N (%)	Occurrence N (%)	No Occurrence N (%)	
Vomiting within 24 hours	99 (9.5)	391 (37.3)	62 (5.9)	495 (47.3)	<0.01*
Stoma Site Infection	48 (4.6)	440 (42.1)	26 (2.5)	527 (50.6)	<0.01*
Feeding Intolerance	31 (3)	459 (43.8)	54 (5.2)	503 (48)	0.05*
Delay in Advancement of Feeds	29 (2.8)	461 (44)	57 (5.4)	501 (47.8)	0.01*
Aspiration	3 (0.3)	487 (46.5)	6 (0.6)	551 (52.6)	0.51
Tube Dislodgement	3 (0.3)	487 (46.5)	14 (1.3)	543 (51.9)	0.24
Need for OR Post-Op	0 (0)	490 (46.8)	9 (0.9)	548 (52.3)	<0.01*
Total Complications	**213 (2.9)**	**3215 (43.9)**	**228 (3.1)**	**3668 (50.1)**	**0.52**

* Significant values (p≤0.05) – Fisher's Exact test

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FAMILY HISTORY IS HIGHLY PREDICTIVE OF SURGICAL INTERVENTION BUT POORLY CORRELATED WITH BREAST MASS MALIGNANCY IN PEDIATRIC PATIENTS

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Tweet about it: Does family history matter in the management of pediatric breast masses?

Purpose: Family history is considered highly predictive of breast malignancy in the evaluation of adult breast masses. The significance of a positive family history of breast cancer has not been previously evaluated in the pediatric population. We hypothesized that family history would increase the likelihood of biopsy without correlating with malignancy.

Methods: Institutional data (2011-2015) was reviewed for patients aged ≤21 years presenting to a pediatric hospital with breast mass (n=374). Age, gender, clinical presentation, past medical history, family history, oral contraception use, imaging, and diagnosis were recorded for each patient. Bivariate analysis and logistic regression were performed. Biopsy costs were estimated using Pediatric Health Information System data (2011-2015).

Results: Of the 374 patients, 22.99% (n=86) underwent excisional biopsy. Males less frequently underwent biopsy than females ($p=0.0096$). Of those biopsied, 97.7% (n=84) had benign breast tumors with most being fibroadenomas (n=63). Only 2.3% (n=2) were malignant (one sarcoma and one low-malignant). Breast masses that increased in size were significantly more likely to be biopsied than masses that did not ($p<0.0001$). As the number of family members with breast cancer increased, so did the probability of biopsy ($p<0.0001$). Although the frequency of breast cancer in relatives ($p=0.0003$) and the mass size ($p<0.0001$) significantly increased the likelihood of biopsy, neither factor was predictive of malignancy. Biopsy was also noted to incur significant costs and averaged $7663.50 per pediatric patient.

Conclusions: Although no literature identifies a link between family history of breast cancer and increased risk in pediatric patients of breast malignancy, these patients more frequently undergo biopsy. Family history may not be significant in determining the management of pediatric breast masses. In patients with small lesions without concerning features on radiography, non-operative monitoring may be considered as a safe alternative to invasive biopsy in the pediatric patient.

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PREDICTORS OF OUTCOME IN FETUSES WITH OMPHALOCELE

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Purpose: To evaluate prenatal predictors of outcome for fetuses with omphalocele.

Methods: A retrospective chart review was conducted of all fetuses with omphalocele evaluated at a comprehensive fetal center between 2002 and 2015. Prenatal imaging, including fetal MRI measurement of observed-to-expected total fetal lung volume (O/E-TFLV) and postnatal outcomes were compared. Patients were classified as isolated, or omphalocele with minor or major associated anomalies. Major anomalies were defined as a cardiac defect requiring immediate medical or surgical treatment, congenital diaphragmatic hernia, or major chromosomal abnormalities. All other anomalies were classified as minor. Giant omphalocele was defined by >50% of liver herniating into the sac.

Results: Seventy-four fetuses had comprehensive prenatal evaluation. Of live-born fetuses (n=54), those with major additional anomalies (n=10) had significantly lower survival compared to those with isolated (n=13) or minor anomalies (n=31) (50% vs. 100% vs. 90%, p=0.02). Additionally, those with major anomalies had longer median duration of tracheal intubation (36 vs. 5 vs. 7 days, p=0.028). For fetuses with isolated or minor anomalies, fetal MRI O/E-TFLV correlated significantly with postnatal pulmonary function. Using ROC analysis, an O/E-TFLV<42% predicted a ventilator requirement >7 days (AUC=0.89, sensitivity 92.3%, specificity 83.3%).Infants with O/E-TFLV<42% had worse pulmonary outcome by all parameters assessed but without a significant decrease in survival (see table).

Conclusion: For fetuses with omphalocele, the presence of a major additional anomaly is the strongest predictor of mortality and pulmonary morbidity. For those without a major anomaly, fetal MRI measurement of lung volumes is predictive of pulmonary function and hospital stay.

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Table 1. Characteristics and Morbidity by O/E-TFLV

	O/E TFLV < 42% (n=7)	**O/E TFLV >42% (n=25)**	**p-value**
Giant Omphalocele	71%	52%	0.426
Gestational age on first MRI (weeks)	25.95 ± 4.8	24.7 ± 2.36	0.525
Duration of tracheal intubation (days), median (range)	106 (1-902)	0 (0-92)	<0.001
Supplemental O2 at 1 month	85 %	4 %	<0.001
Supplemental O2 at 6 months	43 %	4 %	0.018
Supplemental O2 at 1 year	43 %	0	0.005
Length of stay (days), median (range)	87 (33-433)	15 (5-181)	0.001
Tracheostomy	43 %	0	0.008
Survival	86 %	100 %	0.219

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P51

UMBILICAL STROMAL CELLS MEDIATE INTESTINAL PROTECTION FOLLOWING ISCHEMIA/REPERFUSION INJURY BY NITRIC OXIDE DEPENDENT PATHWAYS

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Purpose: Umbilical-derived mesenchymal stromal cells (USC) have shown great promise in the protection of ischemic organs following injury. We hypothesized that USCs would improve mesenteric perfusion and preserve intestinal histological architecture by nitric oxide dependent mechanisms following intestinal ischemia/reperfusion injury(IR).

Methods: Adult male wild type C57BL/6J (WT) and eNOS knock out (eNOS KO) mice were used in the following treatment groups: 1)WT IR+Vehicle, 2)WT IR+USC and 3) eNOS KO IR+USC. Mice were anesthetized and a midline laparotomy was performed. The superior mesenteric artery was identified and clamped with a non-occluding clamp for 60-minutes. Following IR, mice were treated with an intraperitoneal injection of 250μL phosphate buffered saline or $2x10^6$ USCs suspended in 250μL phosphate buffered saline. Mesenteric perfusion images were acquired using laser Doppler imaging at baseline, ischemia and at 24 hours after recovery. Perfusion was analyzed as a percentage of baseline. At 24 hours, mice were euthanized and intestines were harvested for histological preparation with H&E. Intestines were evaluated for injury using a well-established scoring system. Data were analyzed using the Mann-Whitney test. $P<0.05$ was considered to be statistically significant.

Results: Intestinal mesenteric perfusion was significantly improved in WT mice treated with USCs(68.2±5.0%) compared to vehicle (32.6±7.7%,$p<0.05$,Figure1A). However, in eNOS KOs, the protection in mesenteric perfusion afforded by USCs was abolished. In similar fashion, histological injury scores were significantly improved in WT mice treated with USCs (WT IR+USC 0.6±0.2) compared to vehicle control (WT IR+Vehicle 3.35±0.3, $p<0.05$). However, these improvements in histological integrity were not observed in eNOS KO mice (Figure1B).

Conclusions: The benefits of USC-mediated therapy following intestinal IR injury likely occur via nitric oxide dependent pathways. Further studies are required to define the molecular mechanisms associated with USC activation of endothelial nitric oxide.

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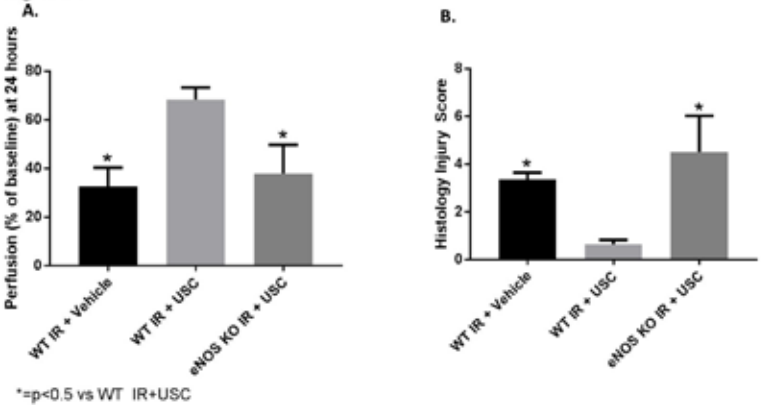
Figure 1



*=p<0.5 vs WT IR+USC

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PREDICTING RESPIRATORY INFECTIONS IN CHILDREN WITH CONGENITAL CYSTIC LUNG LESIONS WITH COMPUTED TOMOGRAPHY IMAGING

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Purpose: Infection risk in children with congenital cystic lung lesions (CCLL) is uncertain and controversy remains over timing of surgical resection. We sought to determine if preoperative computed tomography (CT) findings may predict symptom development and guide lobectomy timing.

Methods: Retrospective chart review of children who underwent lobectomy at a single institution from April 1996 to September 2013 for CCLL. Preoperative CT and pathologic specimens were re-reviewed by a pediatric radiologist and pathologist, respectively. Specialists were blinded to clinical presentations and outcomes.

Results: 57 patients were stratified into two groups based on the presence or absence of preoperative infectious respiratory symptoms; the incidence of preoperative symptoms was 20% (11/55). Median age at lung resection for asymptomatic patients was 9.1 months (IQR 6.3-12.2m) versus 17.7 months (IQR 6.9-71.1m) for symptomatic patients ($p<0.05$). Symptomatic patients had a higher proportion of large cysts (2-10cm) in $\geq$50% of the lesion area on preoperative CT and pathology compared to asymptomatic patients (41.7% vs. 4.7%; $p<0.01$). Additionally, symptomatic patients had a larger median maximum cyst diameter on both preoperative CT (6.4cm (IQR 4.7-9.3cm) vs. 4.5cm (IQR 3.8-5.5cm), $p<0.02$) and pathology (4.0cm (IQR 1.1-5.0cm) vs. 0.6cm (IQR 0.2-1.1cm), $p=0.006$). Symptomatic patients had a higher incidence of mediastinal shift on preoperative CT ($p=0.02$). There was no difference in distribution of gender, laterality, location or pathologic diagnosis between groups. However, noninfectious respiratory symptoms were more common with CPAM type 1 (10/24, 40%) or bronchial atresia (4/8, 50%) compared to CPAM type 2 (3/27, 11.1%) or intralobar bronchopulmonary sequestration (0/6, 0%) ($p=0.007$).

Conclusions: Preoperative CT findings of large cyst predominance and mediastinal shift were associated with preoperative infectious respiratory symptoms, supported by pathology findings. Lobectomy was safely performed at median of 9 months of age in asymptomatic patients. Patients at low infectious risk may be eligible for close observation.

Display Only Posters (cont.)

P53

PRIMARY MEDIASTINAL GERM CELL TUMORS IN CHILDREN AND ADOLESCENTS: EVALUATION OF SURVIVAL AND PREDICTORS OF OUTCOME

William J. Hammond, MD, MS, Enrico Danzer, MD, James A. Saltsman, MD, MPH, Simon Berhe, BS, Anita P. Price, MD, Todd E. Heaton, MD, MPH, Michael P. La Quaglia, MD.

Memorial Sloan Kettering Cancer Center, New York, NY, USA.

Purpose: There are few reports detailing factors prognostic for recurrence and survival in primary mediastinal germ cell tumors (PMGCTs) in children and adolescents. We reviewed our institutional experience with these lesions to identify parameters associated with recurrence and survival.

Methods: With IRB approval, we retrospectively reviewed the medical records of patients (age<22 years) with histologically confirmed PMGCT treated at our institution between 1975 and 2016. Kaplan-Meier distributions were generated and compared using the log-rank test. Variables predictive of recurrence were assessed using competing risk analysis.

Results: We identified 54 patients (51 male [94%]) with a mean age of 17.3 years and a mean follow-up interval of 4.5 years. Seven tumors (13%) were classified as pure seminoma and 87% (n=47) were non-seminomatous. No relapse or death occurred among the pure seminoma patients. Relapse occurred in 59.2% (n=32) of patients with non-seminomatous germ cell tumors, and the 5-year disease-specific survival was 33.5%. Higher stage, positive gross margins, and non-seminomatous histology correlated with recurrence (p=0.01, p=0.01, p=0.05, respectively). Only stage was significantly associated with disease-specific survival.

Conclusions: Mediastinal seminomas have an excellent outcome in this age group. In contrast, non-seminomatous lesions are prone to recur and have a much worse disease-specific survival. Although recurrence may be impacted by more aggressive attempts at resection, improvement in overall survival will require novel therapies.

Display Only Posters (cont.)

P54

A PREDICTIVE MODEL FOR IMPROVED DISPOSITION OF PEDIATRIC TRAUMATIC BRAIN INJURY PATIENTS

Marcelo Cerullo, MPH, **Seth D. Goldstein, MD, MPhil**, Sandra DiBrito, MD, Corina Noje, MD, Susan Ziegfield, NP, Dylan Stewart, MD, Courtney Robertson, MD, Eric Jackson, MD, Isam W. Nasr, MD.

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Purpose: The determination of hospital level of care for pediatric patients with mild to moderate traumatic brain injury (mTBI) is not currently evidence based. The objective of this study was to derive a prognostic scoring tool to determine need for admission to an intensive care unit (ICU) for children with mTBI.

Methods: Patients <5 years old with isolated TBI and Glasgow Coma Score >8 who were admitted to a large academic referral center between 2013 and 2015 were identified. ICU-level monitoring requirement was determined by eventual need for surgery, changes on repeat head imaging, in-hospital status epilepticus, future intubation or readmission within 7-days. Sensitivity and specificity of clinician-determination of trauma bay disposition were compared to a model derived using logistic regression of baseline clinical risk factors for deterioration of clinical status in hospital including Glasgow Coma Score (GCS), imaging findings, prior seizures and loss of consciousness.

Results: Exactly 221 patients with mTBI were included; 55.2% admitted to an ICU. Median age was 6.0 months (IQR 2.1-20 months), 57.9% male, 16.7% had a diagnosis of non-accidental trauma (NAT), and 62.4% had a GCS of 15. On initial imaging, 5.4% had midline shift, 76.9% had skull fracture, and 65.6% had intracranial bleeding. Clinician-determined prediction for ICU-level monitoring had a sensitivity of 82.6% and specificity of 52.0%. Using a threshold of 15% risk of need for ICU-level monitoring, our model had sensitivity of 84.7% and specificity of 62.3%, with 13.1% fewer ICU admissions. C-statistic for our model was 0.78 after 10-fold cross validation (95% confidence interval 0.71-0.86).

Conclusions: In children with mild to moderate TBI, prediction of ICU requirements using a combination of baseline and clinical factors may be preferable to individual clinician determination alone. We have presented a robust prediction model for ICU requirements that can be used to guide decisions about appropriateness of ICU admission.

Plenary Session I

Friday, May 5, 7:30 – 9:00 a.m.

1

SINGLE VISIT SURGERY FOR PEDIATRIC AMBULATORY SURGICAL PROCEDURES: A SATISFACTION AND COST ANALYSIS

Jacob K. Olson, MD, Lisa A. Deming, RN, Denis R. King, MD, Terrence M. Rager, MD, MS, Sarah Gartner, BS, Natalie Huibregtse, BS, R. Lawrence Moss, MD, Gail E. Besner, MD.

Nationwide Children's Hospital, Columbus, OH, USA.

Purpose: Single visit surgery (SVS) consists of same-day pre-operative assessment and operation, with telephone post-operative follow-up. This reduces family time commitment to a single hospital trip rather than two or three. We began SVS for ambulatory patients with clear surgical indications in 2013. The purpose of this analysis was to determine family satisfaction, cost savings to families and institutional financial feasibility of SVS.

Methods: SVS patients were compared to age/case matched conventional control patients. We assessed satisfaction by post-operative telephone survey. We calculated family cost savings as lost revenue (based on median income by zip code; 1 day lost for SVS, 2 days for conventional), and transportation costs ($0.50/mile). Reimbursement and day-of-surgery cancellation rates were determined for SVS and conventional patients.

Results: There were 113 patients in each group. Surveys were completed in 42% of SVS families and 28% of conventional families. Satisfaction was high in both groups (98% for SVS *vs.* 93% for conventional; $p = 0.27$). 40% of families in the control group indicated that they would have preferred the SVS option, whereas no SVS families indicated preference for the conventional option ($p < 0.001$). Distance from hospital did not correlate with satisfaction rates. Estimated cost savings for an SVS family was $170 (see table). Reimbursement, hospital and physician charges and day-of-surgery cancellation rates were similar between groups.

Conclusions: SVS provides substantial cost savings to families while maintaining patient satisfaction and equivalent institutional reimbursement. SVS is an effective approach to low risk ambulatory procedures that is less disruptive to families, facilitates access to pediatric surgical care and reduces resource utilization.

Plenary Session I (cont.)

Table 1. Cost analysis for single visit surgery patients vs. conventional surgery patients

	Single Visit Surgery Patients (n=113)	Conventional Surgery Patients (n=113)	Statistical Analysis
Estimated Cost to Family Based on Travel and Time Away From Work	$169.79	$339.57	n/a
Total Reimbursement for Cohort of Patients	$809,878.00	$776,762.02	n/a
Total Charges for Cohort of Patients	$832,011.87	$839,247.78	n/a
Mean Charges Per Patient	$9,244.58	$9,324.98	p = 0.83
Mean Hospital Charges Per Patient	$6,470.96	$6,458.47	p = 0.96
Mean Physician Charges Per Patient	$2,773.62	$2,866.51	p = 0.50
Day-of-surgery Cancellation Rate	19.5%	12.2%	p = 0.14

Plenary Session I (cont.)

2

METABOLIC DYSFUNCTION AND BIOENERGETIC FAILURE IN NEONATAL NECROTIZING ENTEROCOLITIS

Tiffany J. Sinclair, MD[1], Dongyan Zhang, PhD[1], Bruce X. Ling, PhD[1], Claudia M. Mueller, MD, PhD[2], Harvey J. Cohen, MD, PhD[3], Karl G. Sylvester, MD[2].

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Purpose: We hypothesized that prematurity predisposes to metabolic vulnerability, and in combination with inadequate nutritional delivery, leads to bioenergetic failure and the development of necrotizing enterocolitis (NEC).

Methods: We queried a multicenter, longitudinal database that included 995 preterm infants (<32 weeks gestation) and 72 cases of NEC. Plasma samples were obtained on day of life (DOL) 1, 7, 28, and 42. Metabolite data from each time point included 72 amino acid (AA) and acylcarnitine (AC) measures. Nutritional data were averaged at each of the same time points. Odds ratios (OR) and 95% confidence intervals (CI) were calculated using the Day 1 analyte levels. Corrections were made for birth weight, gestational age, and multiple hypothesis testing. Loess curves were plotted over time for the significant analytes and for the nutritional data.

Results: Day 1 analyte levels of phenylalanine (OR 1.6, CI 1.4-2.2), citrulline/arginine ratio (OR 0.4, CI 0.2-0.8), and arginine (OR 1.4, CI 1.1-1.9) were significantly associated with NEC and these differences persisted over time. Citrulline levels, in particular, were significantly different longitudinally between case and control subjects (p=2.25x10-10). Levels were similar at birth and increased with age in the control subjects, however remained low in subjects that developed NEC. Subjects with NEC received significantly lower weight-adjusted total calories (p=2.9x10-4) overall. In subjects diagnosed with NEC after DOL 28 (n=9), total energy (kcal/kg/day) received was similar to control subjects until approximately DOL 25, at which point infants who developed NEC began receiving less weight-adjusted total calories.

Conclusions: Premature infants who develop NEC demonstrate metabolic dysfunction both at birth and over time. Citrulline, a non-proteinogenic AA which correlates with enterocyte mass and intestinal failure, was significantly lower in infants with NEC, suggesting decreased enterocyte metabolic capacity. The progressive metabolite abnormalities observed in infants who acquire NEC may reflect bioenergetic failure secondary to caloric deficiencies.

Plenary Session I (cont.)

3

FETAL BONE MARROW HOMING OF DONOR MESENCHYMAL STEM CELLS AFTER TRANSAMNIOTIC STEM CELL THERAPY (TRASCET)

Hester F. Shieh, MD, Azra Ahmed, BS, Sarah A. Tracy, MD, David Zurakowski, PhD, Dario O. Fauza, MD, PhD.
Boston Children's Hospital, Boston, MA, USA.

Purpose: Transamniotic stem cell therapy (TRASCET) has proven beneficial in fundamentally different models of congenital anomalies, with donor cell engraftment patterns incompatible with solely direct amniotic seeding. We sought to determine whether the fetal bone marrow is a component of donor cell engraftment after TRASCET. A secondary goal was to examine the chronology of previously reported placental cell trafficking in this setting.

Methods: After IACUC approval, Sprague-Dawley rat fetuses (n=386) were divided into two groups based on the content of volume-matched intra-amniotic injections performed on gestational day 17 (E17; term E22): either a concentrated suspension of amniotic fluid mesenchymal stem cells (afMSCs) labeled with a luciferase reporter gene (n=213), or an acellular suspension of recombinant luciferase (n=173). Infused afMSCs consisted of syngeneic rat cells with mesenchymal progenitor identity confirmed by flow cytometry. Placental samples were procured at daily time points thereafter until term (E18-22). Fetal bone marrow was obtained only at term due to size constraints. All specimens were screened for luciferase activity via microplate luminometry. Statistical analysis was by Fisher's exact test, Mann-Whitney U-test and repeated measures ANOVA.

Results: Donor afMSCs were consistently identified in the bone marrow and placenta of fetuses receiving labeled afMSCs, but not in those receiving acellular suspension of luciferase ($P<0.001$). Luminescence, as measured in Relative Light Units (RLUs), was significantly higher in placentas at E18 compared to E19 ($P<0.001$), E20 ($P=0.007$), and E21 ($P=0.004$), with no difference with E22/term ($P=0.97$). Fetal bone marrow and placental samples showed comparable RLUs at term ($P=0.58$).

Conclusions: Donor mesenchymal stem cells home to the fetal bone marrow after concentrated intra-amniotic injection. The chronology of placental trafficking in this setting is suggestive of controlled cell routing, rather than plain cell clearance. Hematogenous donor cell engraftment including the fetal bone marrow significantly expands potential applications of transamniotic stem cell therapy.

Plenary Session I (cont.)

4

SEVERE NEURODEVELOPMENTAL DISABILITY AND HEALTHCARE NEEDS AMONG SURVIVORS OF MEDICAL AND SURGICAL NECROTIZING ENTEROCOLITIS - A PROSPECTIVE COHORT STUDY

Brenna S. Fullerton, MD[1], Cristine S. Velazco, MD, MS[1], Charles R. Hong, MD[1], Charles E. Mercier, MD[2], Kate A. Morrow, MS[3], Erika M. Edwards, PhD, MPH[4], Karla R. Ferrelli, BA[3], Roger F. Soll, MD[4], Biren P. Modi, MD[1], Jeffrey D. Horbar, MD[4], Tom Jaksic, MD, PhD[1].

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Tweet about it: Severe neurodevelopmental disability and healthcare needs after discharge: ELBW survivors of NEC are at high risk

Purpose: Necrotizing enterocolitis (NEC) commonly affects extremely low birth weight (ELBW) neonates and is associated with significant mortality. To better characterize morbidity, we evaluated neurodevelopmental outcomes and healthcare needs among survivors of medical and surgical NEC, compared to those without a history of NEC.

Methods: Data were collected prospectively on ELBW (401-1000g) neonates born 1999-2012 at 47 North American centers. Detailed neurodevelopmental evaluations were conducted at 18-24 months corrected age. Information regarding rehospitalizations, post-discharge surgeries and feeding was also collected. "Severe neurodevelopmental disability" was defined as: bilateral blindness, hearing impairment requiring amplification, inability to walk 10 steps with support, cerebral palsy, and/or Bayley Mental or Psychomotor Developmental Index <70. Diagnosis of NEC required both clinical and radiographic findings (minimum Bell's stage II). Surgical NEC was defined as NEC receiving laparotomy or primary peritoneal drainage. Risk ratios are adjusted for gestational age and clustering of infants within hospitals.

Results: Of 20,565 infants eligible for follow-up, 48.3% were evaluated: 9,063 without NEC, 532 with medical NEC, and 334 with surgical NEC. Characteristics associated with disability were similar between survivors with and without follow-up. Significantly higher rates of morbidity were observed among infants with a history of NEC (Figure 1 & Table 1), and those with surgical NEC were the most frequently affected across all outcome measures.

Adjusted risk ratios (ARR) for morbidity at 18-24 months of age, compared to infants without NEC				
	Medical NEC		**Surgical NEC**	
	ARR (95% CI)	**p**	**ARR (95% CI)**	**p**
Severe neurodevelopmental disability	1.35 (1.14-1.60)	<0.001	2.02 (1.66-2.46)	<0.001
Medical rehospitalization	1.11 (0.99, 1.23)	0.07	1.52 (1.35-1.70)	<0.001
Post-discharge surgery	1.32 (1.13-1.54)	<0.001	1.73 (1.48-2.02)	<0.001
Post-discharge tube feeds	1.59 (1.24-2.04)	<0.001	3.14 (2.62-3.77)	<0.001

Conclusion: Extremely low birth weight survivors of necrotizing enterocolitis were at significantly ($p<0.001$) increased risk for: severe neurodevelopmental disability, post-discharge surgery and tube feeding. Notably, in our cohort of toddlers with a history of surgical necrotizing enterocolitis, 40% demonstrated severe neurodevelopmental disability, half underwent post-discharge operations, and over a quarter required tube feeding at home.

Plenary Session I (cont.)

5

NEUROPROTECTION AND DEVELOPMENT IN EXTREMELY PREMATURE LAMBS SUPPORTED ON THE EXTRACORPOREAL ENVIRONMENT FOR NEONATAL DEVELOPMENT (EXTEND) DEVICE

Patrick E. McGovern, MD, Ali Y. Mejaddam, MD, Matthew A. Hornick, MD, Alexander J. Schupper, BA, Grace L. Hwang, BA, Emily A. Partridge, MD, PhD, Constantine D. Mavroudis, MD, Daniel J. Licht, MD, Judith B. Grinspan, MD, J. William Gaynor, MD, William H. Peranteau, MD, Marcus G. Davey, PhD, Alan W. Flake, MD.

The Children's Hospital of Philadelphia, Philadelphia, PA, USA.

Purpose: We have developed an EXTracorporeal Environment for Neonatal Development (EXTEND) device that provides physiologic support to extremely premature lamb fetuses for up to 28 days. Support of normal neurologic development is a critical requirement for clinical translation. We hypothesized that EXTEND would provide neuroprotection from hypoxic injury and support normal neurodevelopment and maturation.

Methods: Seven premature fetal lambs (gestational age 112±4 days) were maintained on EXTEND for up to 28 days (mean 23±5 days). Fetal growth was monitored by ultrasonography, including bi-parietal diameter for assessment of brain growth. Upon post-mortem analysis, brain weight and degree of structural maturation was assessed and compared to six age-matched control lambs. Histology was reviewed independently by two neuropathologists blinded to treatment group. Luxol fast blue staining for regional myelination was quantified using Aperio ImageScope software. Iba-1, a marker for microglial activation and inflammation, was also assessed. Statistical comparisons were made via Student's t-tests; data are presented as mean ± SD.

Results: Bi-parietal diameter in experimental animals followed a normal growth rate and the brain:body weight ratio was not different from control animals (1.28±0.1% vs 1.26±0.4%, $p = 0.92$). Cerebral and cerebellar cortical neuronal layers were preserved in experimental animals. There was no histological evidence of ischemic injury and there were no significant differences in corticospinal and capsular myelination ($p>0.08$ for all regions tested) or Iba-1 positivity ($p=0.3$) compared to controls.

Conclusions: Lambs delivered prematurely and maintained on our extracorporeal support environment display evidence of normal brain growth and maturation, without signs of hypoxic or ischemic injury. This system has the potential to prevent much of the neurologically associated morbidity and mortality due to extreme prematurity in humans.

Plenary Session I (cont.)

6

EVALUATING THE UTILITY OF THE "LATE ECMO REPAIR": A CONGENITAL DIAPHRAGMATIC HERNIA STUDY GROUP INVESTIGATION

Ian C. Glenn, MD[1], Sophia Abdulhai, MD[1], Neil L. McNinch, MS, RN[1], Pamela A. Lally, MD[2], Todd A. Ponsky, MD[1], Avraham Schlager, MD[1].

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Purpose: The optimal timing of congenital diaphragmatic hernia (CDH) repair in patients requiring extracorporeal membrane oxygenation (ECMO) remains controversial. "Late ECMO repair" is a time-honored approach whereby the patient, once deemed stable for decannulation from ECMO, is repaired while still on ECMO to enable return to ECMO if surgery induces physiologic instability. The goal of this study was to investigate the potential benefit of this approach by evaluating the rate of return to ECMO after repair.

Methods: The CDH Study Group database was used to analyze patients born between the years 1995-2016 who received ECMO and underwent CDH repair. The primary outcome was the proportion of "post-ECMO" patients who required return to ECMO within 72-hours of CDH repair. Secondary analysis compared the post-ECMO group to "on ECMO" repair patients in terms of birth weight, estimated gestational age (EGA), in-hospital mortality, patch repair and liver location.

Results: A total of 1744 patients underwent ECMO cannulation followed by CDH repair. Of these, 1080 were repaired on ECMO and 664 were repaired post-ECMO decannulation. Four patients (0.6%) in the post-ECMO group required return to ECMO within 72 hours of surgery. Secondary analysis demonstrated that on ECMO repair patients had lower birth weight (mean 3.1 vs 3.1, interquartile range 2.7-3.4 vs 2.8-3.5, $p = 0.01$), lower odds of abdominal liver location (odds ratio [OR] 0.63, 95% confidence interval [CI] 0.47-0.86), higher odds of in-hospital death (OR 2.38, CI 1.89-2.99), and higher odds of patch repair (OR 2.05, CI 1.57-2.67). There was no significant difference in EGA ($p = 0.07$).

Conclusion: The rate of return to ECMO following CDH repair is extremely low and does not justify the risk of complications inherent to "on ECMO" repair. Patients stable to come off of ECMO should undergo repair after decannulation.

Plenary Session I (cont.)

7

LAPAROSCOPIC GASTROESOPHAGEAL DISSOCIATION IN NEUROLOGICALLY IMPAIRED CHILDREN WITH RECURRENT GASTROESOPHAGEAL REFLUX

Jonathan H. DeAntonio, MD, Shannon F. Rosati, MD, Dan W. Parrish, MD, Claudio Oiticica, MD, David A. Lanning, MD.

Children's Hospital of Richmond at Virginia Commonwealth University School of Medicine, Richmond, VA, USA.

Purpose: Neurologically impaired children with severe, recurrent gastroesophageal reflux disease (GERD), after a failed fundoplication, are frequently readmitted to the hospital due to recurrent aspiration and respiratory illness. We theorized that a laparoscopic gastroesophageal dissociation (LGED) may decrease rates of aspiration and hospital readmissions as well as improve quality of life (QOL).

Methods: A retrospective review was performed on our pediatric patients that underwent a LGED, along with a caregiver survey, from 2012 to 2016.

Results: Twenty-one neurologically impaired patients (14 months-17 years) with severe, recurrent GERD underwent a LGED with 19 of them having had at least one fundoplication (max=3). Patients weighed 7.9-57kg (avg=23.6kg), length of stay ranged from 5-20 days (avg=12 days), estimated blood loss ranged from <5cc-450cc (avg=69cc, median=25cc), and duration of operation ranged from 299-727min (avg=477min). One patient died from gram-negative sepsis on postoperative day 18, and two others died during the follow-up period due to unrelated causes. There were only 3 readmissions among the 19 remaining patients, one for a dislodged feeding tube and two with viral illnesses. Every patient had resolution of their GERD (follow-up avg=9.2months, max=19months) with minimal to no retching or vomiting. There was a decrease in healthcare visits for aspiration and respiratory illnesses (rated 5/5 from all 13/19 survey respondents), as well as improvements in perceived QOL of the patient (avg=4.3/5) and caregiver (avg=4.6/5).

Conclusions: In neurologically impaired patients with recurrent GERD, relying on long-term gastrojejunostomy feeds or redoing the fundoplication often leads to significant reflux-related problems. After having a LGED, our cohort of patients had resolution of their retching and vomiting, a reduction in readmissions for reflux-related respiratory illness, and improved patient and caregiver QOL. In neurologically impaired patients with severe, recurrent GERD, a LGED may be a viable alternative to traditional treatments in this challenging patient population.

Plenary Session I (cont.)

8

RHO KINASE INHIBITOR PROTECTS AGAINST CHANGES IN TIGHT JUNCTIONS INDUCED BY NECROTIZING ENTEROCOLITIS

Guillermo J. Ares, MD[1], Justyna S. Grothaus, MD[2], Carrie Y. Yuan, BS[2], Douglas R. Wood, BS[2], Catherine J. Hunter, MD[2].

[1]University of Illinois at Chicago and Northwestern University, Chicago, IL, USA, [2]Northwestern University, Chicago, IL, USA.

Purpose: Necrotizing enterocolitis (NEC) is a gastrointestinal emergency affecting 5-10% of NICU patients. No single therapeutic target has been identified. Activation of Rho kinase is implicated in disruption of tight junction structure and permeability. We hypothesized that Rho kinase inhibition would counteract NEC-induced intestinal permeability and changes in tight junction proteins (i.e. occludin).

Methods: Experimental NEC was studied in confluent Caco-2 cells exposed to lipopolyssacharide and in rat pups subjected to hypoxia and bacteria-containing formula vs. controls. Experimental groups were pretreated with Rho kinase inhibitor prior to inducing NEC. Pups and Caco-2 cells were separated into 4 groups: controls, NEC, Rho kinase inhibitor, and Rho kinase inhibitor + NEC. Pup samples were scored for histological intestinal injury. Pup and Caco-2 permeability were assayed by FITC. Following IRB approval, human intestine samples from patients with and without NEC were collected. Changes in occludin for all samples were analyzed by qPCR, western blot, and immunofluorescence. Data were analyzed with Student's t-test or ANOVA.

Results: Pups pretreated with Rho kinase inhibitor had decreased intestinal injury scores. Permeability was increased in Caco-2 NEC group, but not in those pretreated with the inhibitor ($p=0.02$). Occludin gene expression in humans with NEC was decreased 6-fold compared to controls ($p<0.037$). Rho kinase inhibitor pretreatment protected against decreased occludin expression in Caco-2 cells by qPCR ($p=0.0009$). Western blot analysis confirmed upregulation of occludin in groups pretreated with Rho kinase inhibitor vs NEC groups in rats ($p=0.027$) and Caco-2. Immunofluorescence revealed preserved epithelial occludin staining similar to control in groups pretreated with the inhibitor. Normal epithelial occludin architecture was absent in NEC.

Conclusions: Increased permeability and loss of occludin are seen in human and experimental necrotizing enterocolitis. These effects are diminished in groups pretreated with Rho kinase inhibitor. Rho kinase inhibition may be a potential therapeutic target against NEC.

Plenary Session I (cont.)

9

EFFECTIVE METHODS TO DECREASE SURGICAL SITE INFECTIONS IN PEDIATRIC GASTROINTESTINAL SURGERY

Andrew Nordin, MD, Stephen Sales, MBA, Gail E. Besner, MD, Marc A. Levitt, MD, Richard Wood, MD, Brian Kenney, MD, MPH.

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Purpose: Gastrointestinal surgery accounts for a large proportion of surgical site infections (SSI) in pediatric patients, resulting in significant morbidity and mortality as well as increased hospital costs and length of stay (LOS). Multicenter studies have demonstrated that high compliance with a bundle of specific perioperative practices reduces infection rates in pediatric spinal, cardiac and neurosurgical operations, but no studies have evaluated bundle usage in pediatric gastrointestinal (GI) surgery. We hypothesized that application of a GI bundle would decrease SSI rates, overall hospital cost and LOS.

Methods: Baseline 30-day SSI rates were established after review of all pediatric patients undergoing GI operations from October 2012 to November 2014. A bundle of preoperative and intraoperative care practices based on current recommendations including skin prep, pre-op warming and appropriate selection and timing of antibiotics was implemented in November 2014. Since implementation, demographics, procedure type, bundle compliance and development of SSI are collected prospectively. Significance values are based on Shewhart process control charts. Subgroup analyses of stoma reversals evaluated the effects on LOS and 30-day inpatient charges using two-tailed t tests.

Results: Baseline SSI rates for all GI procedures was 10%; midgut/hindgut procedures had a higher SSI rate at 12.5%. With increasing bundle compliance, the overall and midgut/hindgut SSI rates decreased to 4.6% and 7.0%, respectively ($p<0.05$; Figure 1). For stoma closures, SSI rates dropped from 19.4% to 5.7% ($p<0.05$), average hospital charges decreased from $114,048 to $64,787 (43.2% decrease, $p=0.04$), and average LOS decreased from 27.4 to 19.6 days (28% decrease, $p=.35$).

Conclusions: Applying a standardized care bundle to GI cases significantly decreased our overall SSI incidence, most notably in midgut/hindgut operations. Among stoma closures specifically, this has greatly decreased hospital costs and LOS. We believe that close attention to compliance with dedicated care bundles will effectively decrease SSI rates in pediatric GI surgery.

Plenary Session I (cont.)

10

PLACENTAL MESENCHYMAL STROMAL CELLS SEEDED ON CLINICAL GRADE EXTRACELLULAR MATRIX IMPROVE AMBULATION IN OVINE MYELOMENINGOCELE

Sandra K. Kabagambe, MD, Benjamin A. Keller, MD, James C. Becker, MD, Laura F. Goodman, MD, Christopher D. Pivetti, MS, Lee Lankford, MA, Zoe Saenz, BS, Y Julia Chen, MD, Priyadarsini Kumar, PhD, Melissa A. Vanover, MD, Aijun Wang, PhD, Diana L. Farmer, MD.

University of California, Davis, Sacramento, CA, USA.

Purpose: The purpose of this study is to demonstrate in an ovine model that early gestational age (GA) placental mesenchymal stromal cells (PMSCs) seeded on clinical grade small intestinal submucosa (SIS)-derived extracellular matrix (ECM) augment fetal repair of myelomeningocele (MMC) by improving hind limb neurologic function. We previously demonstrated similar results by seeding PMSCs on research grade rat tail collagen matrix.

Methods: MMC defects were surgically created in 21 fetuses at mean GA 77.9 days by removing the skin, paraspinal muscles, 6 lumbar laminae and dura. Repair with ECM only or ECM-PMSCs at a density of 42000 cells/cm² was randomly allocated. Repair at mean GA 101.1 days included re-exposing the spinal cord (SC), applying the ECM and primarily closing the skin. Fifteen surviving fetuses were delivered at mean GA 145.9 days, including 1 with additional birth defects that was not included in the analysis. Motor function was evaluated using the Sheep Locomotor Rating (SLR) scale (0-15, 0= paraplegia, 15=spontaneously ambulating). Histologic analysis of the SC was completed. Treatment groups were compared using the Mann-Whitney U-test.

Results: Fetal viability was 71%. Five of eight lambs (63%) repaired with ECM-PMSCs were able to ambulate independently versus only one of six (17%) repaired with ECM only. Although not statistically significant, the SLR scores and large neuron densities were higher in the ECM-PMSCs group (Table 1).

Conclusions: Fetal repair of MMC with PMSCs seeded on SIS-derived ECM improves hind limb neurologic function in lambs. Using ECM helps preserve the architecture of the SC, but adding PMSCs increases SLR scores and large neuron density. Clinical studies are needed to show benefits in humans.

Table 1. Functional and histologic comparison of treatment groups

Outcome	ECM-PMSCs treated lambs (n=8)	ECM-only treated lambs (n=6)	p-value
Median SLR score (0-15)	15 (4-15)	6 (3-15)	0.09
Mean large neuron density(μm/mm²)	18.81 ± 4.31	13.85 ± 7.03	0.23
Mean gray matter area (% of normal area)	35 ± 10	32 ± 13	0.95
Mean spinal cord area(% of normal area)	43 ± 9	42 ± 12	0.85

Scientific Session I

Scientific Session I: Enterocolitis, Sepsis, Basic Science
Friday, May 5, 10:30 a.m. - Noon

11

HIRSCHSPRUNG-ASSOCIATED ENTEROCOLITIS SHARES GENETIC PATHWAYS WITH INFLAMMATORY BOWEL DISEASE

Talin Hartunians, PhD[1], Emebet Mengesha, PhD[1], Zhenqiu Liu, PhD[2], Tomas Wester, MD, PhD[3], Agneta Nordenskjöld, MD, PhD[4], Akemi L. Kawaguchi, MD[5], Daniel H. Teitelbaum, MD[6], Dermot P. McGovern, MD, PhD[1], **Philip K. Frykman, MD, PhD, MBA**[7].

[1]The F. Widjaja Foundation Inflammatory Bowel and Immunobiology Research Institute, Cedars-Sinai Medical Center, Los Angeles, CA, USA, [2]Biostatistics and Bioinformatics Research Center at the Cedars-Sinai Samuel Oschin Comprehensive Cancer Institute, Los Angeles, CA, USA, [3]Department of Pediatric Surgery, Astrid Lindgren's Children's Hospital, Karolinska University Hospital, Stockholm, Sweden, [4]Department of Women's and Children's Health and Center of Molecular Medicine-CMM, Karolinska Institute, Stockholm, Sweden, [5]Department of Pediatric Surgery, University of Texas Health Science Center Houston, Houston, TX, USA, [6]Division of Pediatric Surgery, C.S. Mott Children's Hospital, University of Michigan Medical School, Ann Arbor, MI, USA, [7]Division of Pediatric Surgery, Departments of Surgery and Biomedical Sciences Cedars-Sinai Medical Center, Los Angeles, CA, USA.

Purpose: Recent reports have identified Hirschsprung disease (HD) patients with chronic Hirschsprung-associated enterocolitis (HAEC) who had clinical and pathological features consistent with IBD, suggesting the possibility of biological similarities between HAEC and IBD. Immune-driven diseases including ankylosing spondylitis, psoriasis and primary sclerosing cholangitis have shared genetic signatures with IBD. The purpose of this study was to identify immune-related genetic associations and pathways in HAEC patients compared with HD patients free from enterocolitis.

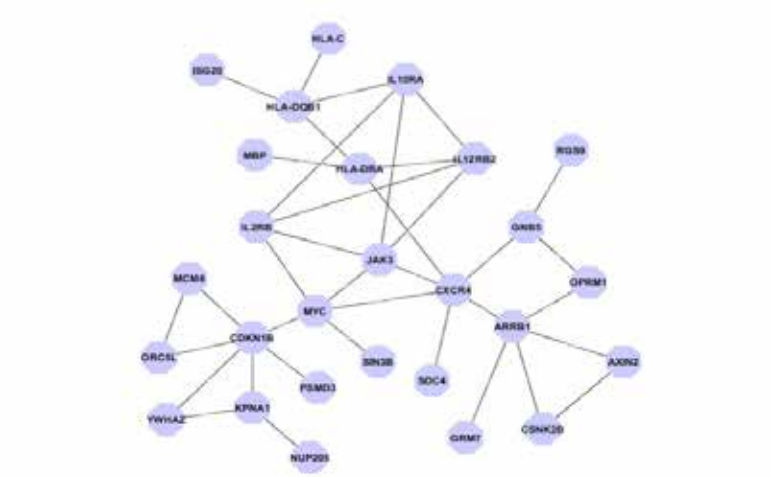
Methods: An IRB-approved international multicenter study enrolled 116 consecutive HD patients, median age 6, IQR (3-8), all of whom were scored using the Pastor et al. criteria HAEC score (0-20). To avoid population stratification, only European ancestry subjects were included in the analyses. HAEC score was analyzed as a quantitative trait using linear regression with permutation, adjusting for population sub-structure with 2 principal components. DNA was isolated from blood and run on the immune-focused Illumina Immunochip-v2 array, comprising 253,702 SNPs. Following stringent QC measures, 199,110 SNPs with MAF>3% were available for analyses. Enrichment analysis tool in STRING was used to identify KEGG pathways associated with HAEC.

Results: Eighty-five unrelated HD patients were analyzed, and we identified 179 SNPs with (mapped to 47 known genes) nominally significant evidence of association ($P<0.001$) with HAEC. Genetic pathway analysis identified 13 pathways with false discovery rate <0.05 (Table, Figure); all of which are also associated with IBD. Interestingly no associations were found between HAEC and SNPs located within or near known Hirschsprung-associated genes.

Conclusion: HAEC shares genetic pathways with IBD, strongly suggesting overlapping biological mechanisms. Further investigation is needed to define genetic and

Scientific Session I (cont.)

environmental risks for HAEC.



HAEC associated gene network of known biological interactions. Genes HLA-DRA, JAK3 HLA-DQB1, MYC, CXCR4, and IL2RB are known to have IBD associated loci.

Scientific Session I (cont.)

12

TOLERANCE INDUCTION AFTER IN UTERO HEMATOPOIETIC CELL TRANSPLANTATION IS DEPENDENT UPON A MINUTE SUBPOPULATION OF LINEAGE NEGATIVE CELLS

John D. Stratigis, MD[1], Nicholas J. Ahn, MD[1], Haiying Li, BS[1], Camila G. Fachin, MD, MSC[2], Andre I B S Dias, MD, PhD[2], Aimee G. Kim, MD[1], William H. Peranteau, MD[1], Stavros P. Loukogeorgakis, MD, PhD[3], Alan W. Flake, MD[1].

[1]The Children's Hospital of Philadelphia, Philadelphia, PA, USA, [2]Federal University of Paraná, Curitiba, Brazil, [3]Surgery Unit, Institute of Child Health, University College London, London, United Kingdom.

Tweet about it: Tolerance induction after in utero hematopoietic cell transplantation is dependent upon a minute subpopulation of lineage negative cells

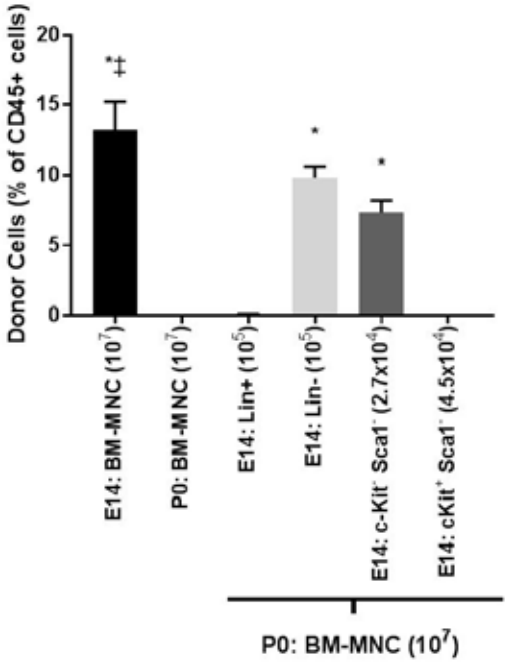
Purpose: In utero hematopoietic cell transplantation (IUHCT) results in induction of tolerance permissive for allogeneic hematopoietic engraftment and organ transplantation. However, in utero transplantation of enriched hematopoietic stem cells (HSC) alone is not tolerogenic and does not engraft across MHC barriers. In the present study we sought to identify the distinct population within whole bone marrow that is responsible for tolerance induction.

Methods: Bone marrow isolated from 6-week old B6GFP (GFP+) mice was sorted into four subpopulations based on c-kit and Sca-1 expression after standard lineage depletion. Allogenic IUT of the dose of each subpopulation contained in 10^7 BM cells (tolerance control) was performed at E14 into Balb/c mice via the vitelline vein. Migration to the thymus was analyzed for each population at E16 and for tolerance assessment each group received an additional transplant of 10^7 B6GFP BM cells at P0. Hematopoietic engraftment of donor cells (% GFP+ within total CD45+) was assessed at 4 weeks in blood. Statistical analysis was performed using 1-way ANOVA with Bonferroni post-hoc tests.

Results: Transplantation of 10^7 allogenic BM-MNC resulted in successful hematopoietic engraftment when injected at E14 (9.6±3.7%), but cells were rejected when administered without IUHCT at P0 (0.01±0.01%, $p<0.0001$). Lin+ cells (10^5) did not home to the thymus and did not induce tolerance (0.09±0.06%), which was in contrast to what was observed for Lin- cells (10^5 cells; 9.1±1.1%; $p<0.001$). Of the four Lin- subpopulations only cKit-/Sca1- cells homed to the thymus at E16 and induced tolerance ($2.7x10^4$ cells; 6.8±1.0; $p<0.01$ vs. other Lin- subpopulations and Lin+; $p>0.05$ vs. Lin-; Figure 1).

Conclusion: In this murine model, tolerance induction is dependent upon Lin- c-kit- Sca1- cells, a minute subfraction of BM cells. This finding has important clinical implications for prenatal tolerance induction for cellular and organ transplantation.

Scientific Session I (cont.)



* p<0.01 vs P0:BM-MNC (10^7), E14: Lin+ (10^5)+P0: BM-MNC (10^7), and E14: c-Kit$^+$ Sca1$^+$ ($4.5x10^4$)+P0: BM-MNC (10^7); ‡ p<0.05 vs E14: c-Kit$^+$ Sca1$^+$ ($2.7x10^4$)+P0: BM-MNC (10^7)

Scientific Session I (cont.)

13

ORGAN INJURY AND INFLAMMATION ARE REDUCED IN THE ABSENCE OF RECEPTOR-INTERACTING PROTEIN KINASE 3 (RIPK3) IN NEONATAL SEPSIS

Laura W. Hansen, MD[1], Weng-Lang Yang, PhD[2], Alexandra C. Bolognese, MD[1], Jose M. Prince, MD[1], Jeffrey M. Nicastro, MD[1], Gene F. Coppa, MD[1], Ping Wang, MD[2].

[1]Northwell Health System, Manhasset, NY, USA, [2]Feinstein Institute for Medical Research, Manhasset, NY, USA.

Tweet about it: Necroptosis and neonatal sepsis

Purpose: Neonates are highly susceptible to sepsis with increased mortality rates. During sepsis, massive numbers of cells die by necrosis and apoptosis. Receptor-interacting protein kinase 3 (RIPK3) is a key protein in regulating a newly-identified death mechanism, programmed necrosis or necroptosis. We hypothesized that deficiency of RIPK3 would be beneficial in neonatal sepsis.

Methods: Sepsis was induced in neonatal (age 5-7d) C57BL6 (WT) and RIPK3 knockout (KO) mice by intraperitoneal injection of adult cecal slurry (0.9mg/g, LD_{100} in 20 hours). Ten hours after cecal slurry injection, mice were sacrificed and tissues were collected for various analyses. Sham mice received intraperitoneal 0.9% saline injections.

Results: Serum cytokines IL-6 and IL-1β increased by 483- and 42-fold, respectively, 10h after sepsis in WT mice, compared to sham (Table). These cytokines were reduced by 66.7% and 48.8%, respectively, in septic RIPK3-KO mice. Lung IL-1β protein levels were also reduced by 44.3% in septic RIPK3-KO mice, compared to WT mice. The lung mRNA levels of neutrophil chemoattractant MIP-2 in WT mice was increased 83-fold after sepsis, but was significantly reduced in RIPK3-KO mice. Furthermore, lung myeloperoxidase (MPO) activity was reduced in septic RIPK3-KO mice by 26.4%. Resultant lung tissue injury was attenuated in septic RIPK3-KO mice, as judged by maintained alveolar space, thin alveolar septae, and reduced cellular infiltration on hematoxylin and eosin histologic staining. Additionally, expression of MIP-2 mRNA in the gut tissue of RIPK3-KO septic mice was reduced by 71.3%.

Conclusion: RIPK3 deficiency is protective against systemic and lung inflammation, lung and gut neutrophil infiltration, and lung injury in murine neonatal sepsis. Inhibition of RIP-mediated necroptosis may have therapeutic potential in neonatal sepsis.

	WT Sham	WT Sepsis	KO Sham	KO Sepsis
Serum IL-6 (ng/ml)	0.09 ± 0.01	46.0 ± 9.1*	0.10 ± 0.01	15.3 ± 1.0*#
Serum IL-1β (pg/ml)	8.9 ± 4.8	384.5 ± 33.5*	N.D.	196.9 ± 59.2*#
Lung IL-1β (pg/mg)	7.0 ± 0.7	50.3 ± 7.2*	5.5 ± 0.3	28.0 ± 2.3*#
Lung MIP-2 mRNA (fold)	1.0 ± 0.3	83.8 ± 49.4*	0.25 ± 0.03	25.2 ± 2.7#
Lung MPO activity (U/mg)	0.93 ± 0.09	1.4 ± 0.2*	0.66 ± 0.09	1.03 ± 0.06#
Gut MIP-2 mRNA (fold)	1.00 ± 0.36	24.8 ± 3.0*	0.17 ± 0.05	7.1 ± 2.2#

Mean ± SEM, n=4-8/group; One-way ANOVA, *p<0.05 vs. WT Sham; #p<0.05 vs. WT Sepsis. N.D.: Non-detectable.

Scientific Session I (cont.)

14

PROPHYLACTIC ANTENATAL AND POSTNATAL N-ACETYL CYSTEINE CAN DECREASE INTESTINAL INFLAMMATION ASSOCIATED WITH NECROTIZING ENTEROCOLITIS IN A RAT MODEL

Osnat Zmora, MD[1], Zeev Weiner, MD[2], Ron Bilik, MD[3], Ron Beloosesky, MD[2].

[1]Sheba Medical Center, Ramat Gan, Israel, [2]Rambam Medical Center, Haifa, Israel, [3]Sheba Medical Center, Tel Aviv, Israel.

Purpose: N-Acetyl Cysteine (NAC) is a known anti-inflammatory and antioxidant agent. Our aim was to determine whether NAC treatment during pregnancy and/or in the neonatal period can attenuate the intestinal inflammation associated with intestinal injury in a rat model of necrotizing enterocolitis (NEC).

Methods: Newborn Sprague-Dawley rats were randomized into 3 groups: control (n=10), which were breast-fed and kept in room air; NEC (n=10), which were subjected to hypoxia (5% O_2 for 10 minutes) and formula feeding twice daily; NEC-NAC (n=10), which received NAC (300mg/kg IP twice daily) in addition to hypoxia and formula feeding. Two additional groups included pups of dams which were treated once daily with NAC (300mg/kg IV) for the last 3 days of pregnancy. After birth, the pups were randomized into NAC-NEC (n=10), with hypoxia and formula feeding alone or NAC-NEC-NAC (n=10), with additional postnatal NAC treatment. All pups were killed on the fifth day and the ileum was harvested for protein studies. NF-kB p65 (activated form), TNF-α, and IL-6 protein levels were determined by western blot and compared between the groups by ANOVA. $P<0.05$ was considered statistically significant.

Results: NEC pups had significantly increased ileal levels of NF-kB p65, TNFα, and IL-6 compared to controls (0.26 ± 0.009 vs. 0.1 ± 0.008; 0.28 ± 0.012 vs. 0.08 ± 0.013; 0.27 ± 0.008 vs. 0.09 ± 0.005 u; $P<0.05$). In all NAC treatment groups, the levels of NF-kB p65, TNF-α, and IL-6 were significantly reduced compared to the NEC group. The most pronounced decrease was demonstrated within the NAC-NEC-NAC group (0.11 ± 0.005 vs. 0.26+0.009; 0.13 ± 0.013 vs. 0.28 ± 0.012; 0.14 ± 0.047 vs. 0.27 ± 0.008 u; $P<0.05$).

Conclusions: N-Acetyl Cysteine treatment can decrease intestinal inflammation associated with necrotizing enterocolitis in a rat model by inhibition of the NF-kB pathway. Starting preventive treatment in pregnant patients in high risk for preterm labor may be a novel approach to decrease the risk or severity of NEC in the newborn.

Scientific Session I (cont.)

15

THE FORMATION OF NEUTROPHIL EXTRACELLULAR TRAPS IS INHIBITED BY PROSTAGLANDIN E2 DURING NECROTIZING ENTEROCOLITIS

Yuhki Koike, MD[1], Carol Lee, MSc[1], Bo Li, PhD[1], Augusto Zani, MD, PhD[1], Paolo De Coppi, MD[2], Simon Eaton, PhD[2], Agostino Pierro, MD[1].

[1]Division of General and Thoracic Surgery, The Hospital for Sick Children, Toronto, ON, Canada, [2]UCL Institute of Child Health and Great Ormond Street Hospital, London, United Kingdom.

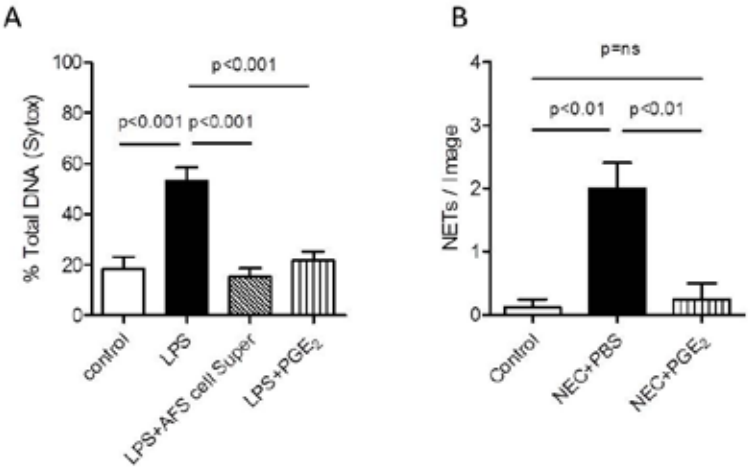
Purpose: Neutrophil extracellular traps (NETs) are an essential component of local and systemic inflammatory responses, and are strongly associated with intestinal inflammatory diseases. Amniotic fluid stem (AFS) cell supernatant improves intestinal inflammation during necrotizing enterocolitis (NEC), due to the release of prostaglandin E_2 (PGE_2). As AFS cell administration in neonates is difficult to be established, the aim of this study is to investigate whether PGE_2 has similar beneficial effects to AFS cells on NETs formation.

Methods: *In vitro*: NETs formation was examined using bone marrow-derived neutrophils (BMDN). BMDNs were isolated from mouse femurs, and infection of $1x10^5$ cells was stimulated by lipopolysaccharide (LPS, 100µg/ml) for 5 hours. NETs was quantified by Sytox Green fluorescence and expressed relative to the amount of total extracellular DNA. Immunofluorescence staining with histone H3, myeloperoxidase and DAPI was used to visualize NETs. *In vivo*: Following ethical approval (n.32238), experimental NEC was induced in 5-day old neonatal mice using hypoxia, oral lipopolysaccharide (4mg/kg) and gavage feeding of hyperosmolar formula. Mice pups were randomly assigned to receiving intra-peritoneal injection of PGE_2 (200µg/kg; n=3) or PBS (50µl; n=3). NETs were stained by Sytox Green fluorescence and visualized using two-photon laser scanning microscopy. NETs were quantified in the endothelial layer (400µm blood distance). Data was reported as mean±SD and compared using one-way ANOVA with Bonferroni post-test.

Results: *In vitro*: visualization of NETs using immunofluorescence staining indicated that LPS induced NETs formation ($p<0.001$), whereas treatment with AFS cell supernatant ($p<0.001$) or PGE_2 ($p<0.001$) prevented their formation. (Figure A). *In vivo*: NETs formation occurred in NEC ($p<0.01$), and the administration of PGE_2 prevented NETs formation ($p<0.01$, Figure B).

Conclusions: *In vitro* NETs formation was abolished by AFS cell supernatant or PGE_2 administration. Similarly, *in vivo* NETs formation is up-regulated during NEC and prevented by PGE_2 administration. PGE_2 represents a novel potential treatment of NEC.

Scientific Session I (cont.)



Scientific Session I (cont.)

16

HUMAN MILK OLIGOSACCHARIDES PROTECT THE INTESTINAL EPITHELIUM AND PREVENT EXPERIMENTAL NECROTIZING ENTEROCOLITIS

Yuhki Koike, MD[1], Richard Wu, PhD[2], Bo Li, PhD[1], Pekka Maattanen, PhD[2], Philip M. Sherman, MD[2], Agostino Pierro, MD[1].

[1]Division of General and Thoracic Surgery, The Hospital for Sick Children, Toronto, ON, Canada, [2]Division of Gastroenterology, Hepatology and Nutrition, The Hospital for Sick Children, Toronto, ON, Canada.

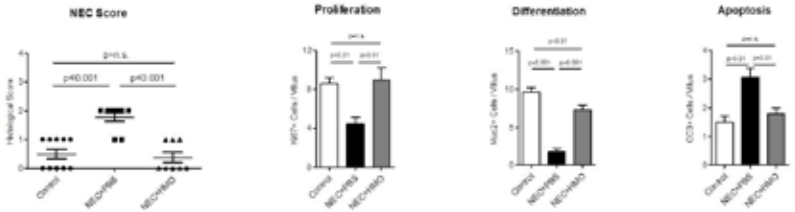
Purpose: Necrotizing enterocolitis (NEC) is a leading cause of death in preterm infants. Breastfed neonates have a lower risk of NEC than those who are formula-fed, but the mechanism underlying this protection remains unclear. Human milk oligosaccharides (HMO) are a component of breast milk capable of suppressing inflammatory processes. The objective of our study was to investigate the effects of HMO on the intestinal epithelium during NEC.

Methods: Following ethical approval (n.32238), NEC was induced in 5-day old neonatal mice using hypoxia, oral lipopolysaccharide (4mg/kg) and gavage feeding of hyperosmolar formula with phosphate buffered saline (PBS, injury group, n=10) or HMO (20 mg/ml, treatment group, n=10). Breastfed pups served as controls (n=10). Mucosal injury in the distal ileum was scored blindly, with NEC diagnosed when the score was ≥2. Using immunofluorescence staining, the intestinal epithelium was assessed for proliferation (Ki67), differentiation (goblet cells, Muc2) and apoptosis (cleaved caspase-3, CC3). Data is reported as mean ± SD and groups are compared using one-way ANOVA with Bonferroni post-test.

Results: HMO reduced mucosal injury and NEC incidence (0/8 in treatment group vs. 7/9 in injury group, $p<0.001$). Epithelial cell proliferation and differentiation decreased during NEC (Ki67 $p<0.01$, Muc2 $p<0.001$), but increased with the administration of HMO (Ki67 $p<0.01$ to PBS, Muc2 $p<0.001$ to PBS). Apoptosis increased during NEC ($p<0.01$) and HMO rescued apoptosis to normal levels ($p<0.01$ to PBS).

Conclusions: This study demonstrates that HMO administration prevents the development of NEC, promotes epithelial proliferation and differentiation, and reduces epithelial cell apoptosis in experimental mouse model. HMO administration is a potential novel treatment for infants at risk of developing NEC.

Scientific Session I (cont.)



Scientific Session I (cont.)

17

AMNIOTIC FLUID STEM CELL DERIVED EXOSOMES RESCUE LUNG EPITHELIUM PROLIFERATION AND ATTENUATE APOPTOSIS IN AN IN VITRO MODEL OF FETAL LUNG INJURY

Vincenzo D. Catania, MD, Jennifer Guadagno, PhD, Qi Ma, BSc, Bibek Saha, BSc, Bo Li, PhD, Augusto Zani, MD, PhD.

The Hospital for Sick Children, Toronto, ON, Canada.

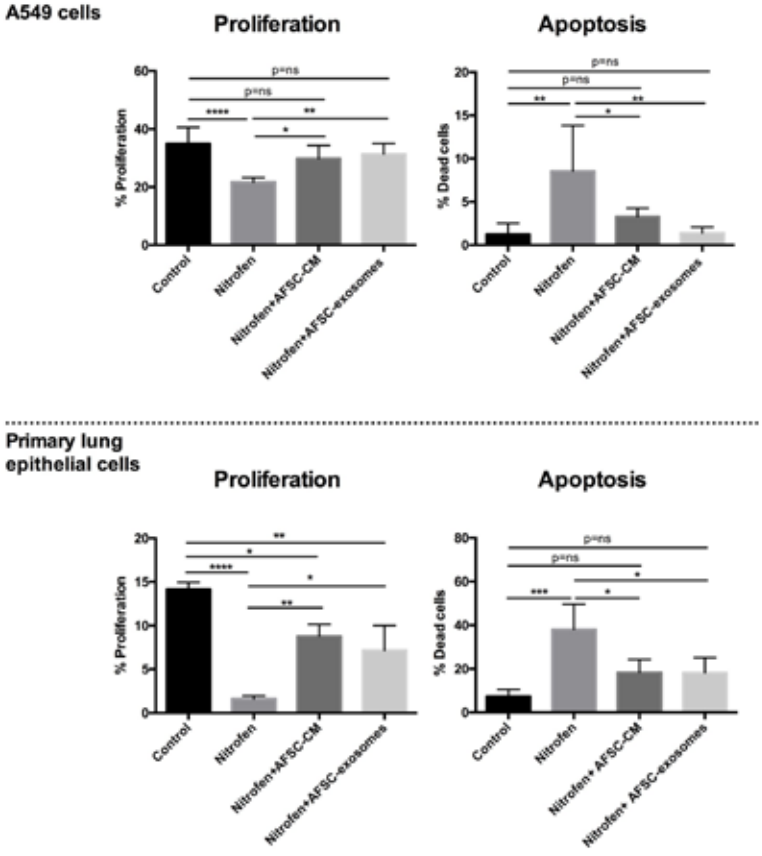
Purpose: Preliminary studies have shown that amniotic fluid stem cells (AFSC) rescue lung hypoplasia via an undetermined paracrine effect. Exosomes are cell-derived vesicles containing proteins, lipids and genetic material that are crucial for intercellular communication. We aimed to investigate whether AFSC derived exosomes mediate the AFSC beneficial effect on a model of fetal lung injury.

Methods: Exosomes were isolated from ultra-centrifuged AFSC derived conditioned medium (AFSC-CM) and quantified by analyzing the protein content with Bicinchoninic Acid Assay and using Nanoparticle Tracking Analysis. CD63+ exosome characterization was confirmed using Western blot. *In vitro* lung injury: using an established model, A549 cells were administered nitrofen alone (40μM), nitrofen+AFSC-CM, or nitrofen+AFSC-exosomes (200μg/ml). Untreated A549 cells served as control. Following 24h incubation, cells were assessed for proliferation (5-ethynyl-2'-deoxyuridine) and apoptosis (Live/Dead-assay). *Ex vivo* lung injury: to investigate whether AFSC-exosomes were beneficial to fetal lungs, at E14.5 primary lung epithelial cells were isolated from embryos of dams that received nitrofen at E9.5 (animal protocol n.39168). Following trypsinization, dissociated Ep-CAM+ cells were isolated using Dynabeads and cultured in Bronchial Epithelial Cell Growth Medium. After 5 days, primary lung epithelial cells were treated with AFSC-CM or AFSC-exosomes (200μg/ml). Fetal lungs of untreated dams served as control. Groups were compared for proliferation and apoptosis as described above. Statistics: one-way ANOVA with Tukey post-test was performed.

Results: Nitrofen administration reduced cell proliferation and increased apoptosis in both A549 and primary lung epithelial cells (**Figure**). Conversely, treatment with AFSC-CM and AFSC derived exosomes reversed the detrimental effect of nitrofen on both proliferation and apoptosis.

Conclusions: The beneficial effect of AFSC on injured fetal lung epithelium is mediated by exosomes. This study proves the principle that stem cell secreted exosomes could represent a promising cell-free therapy for fetuses and/or infants with hypoplastic lungs. Further studies are needed to investigate the protein/genetic content of the AFSC-exosome cargo.

Scientific Session I (cont.)



Scientific Session I (cont.)

18

A NOVEL TREATMENT TO PRESERVE FERTILITY IN FEMALE PATIENTS UNDERGOING CHEMOTHERAPY

Motohiro Kano, MD[1], Amanda Sosulski, MD[1], Lihua Zhang, BS[1], Nicholas Nagykery, BS[1], Dan Wang, PhD[2], Guangping Gao, PhD[2], Patricia K. Donahoe, MD[1], David Pépin, PhD[1].

[1]Pediatric Surgical Research Laboratories, Massachusetts General Hospital, Boston, MA, USA, [2]University of Massachusetts Medical School, Boston, MA, USA.

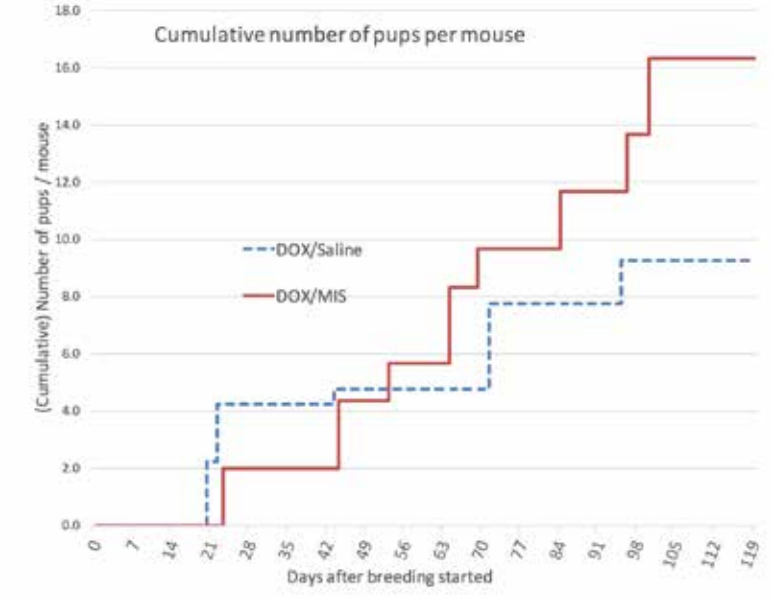
Purpose: Primordial ovarian follicle activation, the first step of folliculogenesis, is independent of gonadotropins and steroids and known to be irreversible. We have discovered that Müllerian Inhibiting Substance (MIS), which is produced by granulosa cells of actively growing follicles, is able to completely block primordial follicle activation and maintain the ovarian reserve. One of the major causes of ovarian insufficiency is chemotherapy-induced "follicular burnout", in which chemotherapy damages actively growing follicles that would normally produce MIS, leading to overactivation and depletion of primordial follicles. We hypothesized that replacement with exogenous recombinant MIS can prevent ovarian insufficiency caused by chemotherapy.

Methods: To test this hypothesis we pre-treated C57BL/6 mice (N=5/group) with intraperitoneal osmotic pump implants delivering recombinant MIS protein during two cycles of doxorubicin (6mg/kg IP/week) or carboplatin (60mg/kg IP/week). Ovaries were recovered, fixed and sectioned to perform total follicle counts. C57BL/6 mice who received doxorubicin and MIS treatment were subsequently mated to males after the treatment, and their fertility and fecundity was monitored.

Results: Implantation of an osmotic pump delivering recombinant MIS protein intraperitoneally in C57BL/6 mice during two cycles of doxorubicin or carboplatin resulted in a 2.9 fold ($p=0.02$) and a 1.4 fold ($p=0.01$) increase respectively in primordial follicle counts compared to control mice receiving chemotherapy plus saline. Intraperitoneal MIS protein delivery during chemotherapy also resulted in an increase in the cumulative number of pups compared to control mice receiving chemotherapy plus saline.

Conclusion: Müllerian Inhibiting Substance (MIS) counteracts the over-activation and depletion of primordial follicles caused by chemotherapy-induced cytotoxicity of growing follicles. MIS may provide a novel treatment to reduce the risk of ovarian insufficiency caused by chemotherapy in young female patients, thus preserving fertility and precluding the potential need for ovarian tissue cryopreservation.

Scientific Session I (cont.)



Scientific Session I (cont.)

19

INTESTINAL HEMODYNAMICS AND POSTPARANDIAL HYPOXIA IN THE NEONATAL PERIOD

Yong Chen, MD, PhD, Yuhki Koike, MD, Lijun Chi, PhD, Hirumo Miyake, MD, Bo Li, PhD, Carol Li, MSc, Paul Delgado-Olguin, PhD, Agostino Pierro, MD.

The Hospital for Sick Children, Toronto, ON, Canada.

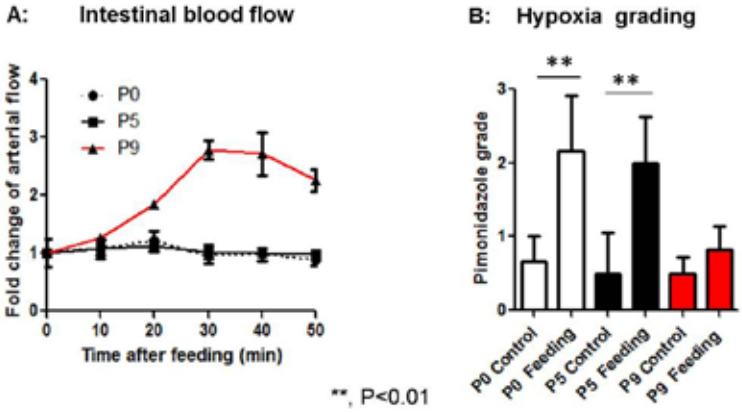
Purpose: Previously we have shown that formula feeding induces intestinal hypoxia in experimental necrotizing enterocolitis (NEC). We propose that after feeding, the immature intestine fails to supply enough blood to meet the increased oxygen demand which may result in bowel hypoxia. This study investigates the feeding-related hemodynamic changes in the developing intestine and its role in postprandial hypoxia.

Methods: Following ethical approval (n.32238), the Rosa$^{mT/mG/+}$;Tie2-Cre mouse strain, which express GFP in endothelial and hematopoietic cells, was generated by crossing Tie2-cre transgenics with Rosa$^{mT/mG/+}$mice. Two-photon microscopy was used to image the ileal microvasculature and blood flow before and after formula feeding in 6 mice (12 areas/animal) at postnatal day 1 (P1), P5 and P9. Six non-fed (control) and 6 formula-fed pups in each age groups were used to study the postprandial intestinal hypoxia using hypoxia probe (pimonidazole). Results were analyzed using 2-way ANOVA and Bonferroni correction.

Results: The number of capillaries in intestinal villi increased from P0 to P9. Formula feeding resulted in dilation of intestinal vessels and increased intestinal blood flow (hyperemia). Postprandial hyperemia occurred after 20 min post-feeding at P9 but not at P5 ($P<0.01$) or P0 ($P<0.01$) (Figure A). In addition, feeding induced intestinal hypoxia as indicated by increased mucosal pimonidazole staining at P0 ($P<0.01$) and P5 ($P<0.01$) but not in P9 mice (Figure B).

Conclusions: We conclude that 1) During early neonatal life, the villous vasculature is immature and there is lack of hyperemia in response to feeding. 2) The feeding-related hypoxia is more prominent in early life and this phenomenon can be due to the immaturity of the intestinal blood flow regulation. This study provides insight on the age-dependent intestinal vascular response to feeding and its potential effect on the development of NEC.

Scientific Session I (cont.)



Scientific Session I (cont.)

20

A COMPARISON OF LIPID MINIMIZATION STRATEGIES IN CHILDREN WITH INTESTINAL FAILURE

Jessica Gonzalez Hernandez, MD[1], Purvi Prajapati, BS[2], Gerald Ogola, PhD[2], Van Nguyen, CPNP[3], Nandini Channabasappa, MD[3], Hannah G. Piper, MD[3].

[1]Baylor University Medical Center, Dallas, TX, USA, [2]Baylor Scott and White Health, Dallas, TX, USA, [3]University of Texas Southwestern/Children's Health, Dallas, TX, USA.

Tweet about it: Comparison of Lipid Minimization and Omegaven in children with Intestinal Failure

Purpose: Children with intestinal failure (IF) receiving parenteral nutrition (PN) often develop intestinal failure-associated liver disease (IFALD). Lipid minimization with Intralipid (IL) or Omegaven (OV) has been used to minimize IFALD, but the preferred treatment is unclear. This study compares outcomes between children with IF and IFALD receiving Intralipid or Omegaven at < 1.5 g/kg/day.

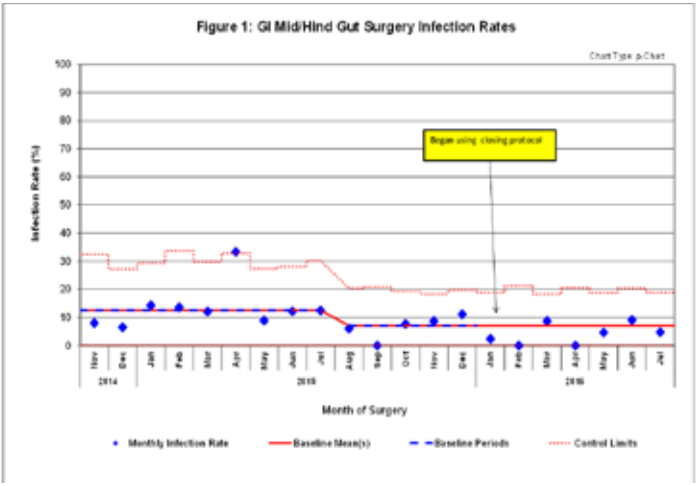
Methods: After IRB approval, a retrospective review of children with IF requiring PN who developed IFALD (direct bilirubin > 2 mg/dL) while receiving IL (2009 - 2015) was performed. Clinical characteristics, nutritional and laboratory values were compared between children given reduced IL or OV to treat the IFALD. P-values < 0.05 were significant.

Results: A total of 17 children were reviewed including 9 treated with IL and 8 treated with OV at a median dose of 1 g/kg/day. Both groups were similar in age, gender, small bowel length and the %PN calories received during the study (84% vs. 76%, p = 0.44). The average direct bilirubin (DBili) prior to initiating treatment was 7.0 ± 4.7 mg/dL and 7.5 ± 3.5 mg/dL (p = 0.82) in the IL and OV groups, respectively. Children receiving reduced IL took a median of 107 days to achieve a DBili < 0.5 mg/dL compared to 124 days in the OV group (p = 0.31). There were no differences in markers of liver function between groups, and both groups had similar growth trajectories throughout the study (Table 1).

Conclusions: Lipid minimization with either IL or OV has similar success in achieving a normal DBili in children with IF and IFALD, without major differences in nutritional status and growth.

Scientific Session I (cont.)

Table 1. Patient Characteristics and Growth Parameters			
	Intralipid (n = 9)	**Omegaven (n = 8)**	**p-value**
Age (months), mean ± SD	5.9 ± 6.6	9.4 ± 7.6	0.32
Expected bowel (%), median (IQR)	32 (23-100)	23 (5-27)	0.12
TPN calories (kcal/kg/d), mean ± SD **Before therapy** **End of therapy**	84.4 ± 25.8 64.6± 10.1	75.9 ± 16.5 57.1 ± 19.2	0.44 0.32
Direct Bilirubin (mg/dL), mean ± SD **Before therapy** **End of therapy**	7.0 ± 4.7 0.3 ± 0.1	7.5 ± 3.5 0.3 ± 0.1	0.82 0.75
Z-score Weight, mean ± SD **Before therapy** **End of therapy**	-2.0 ± 1.3 -1.8 ± 1.2	-2.0 ± 1.4 -1.8 ± 0.6	0.90 1.00
Z-score Height, mean ± SD **Before therapy** **End of therapy**	-2.9 ± 1.3 -2.3 ± 0.9	-2.4 ± 1.6 -2.6 ± 1.2	0.44 0.52
Z-score Head Circumference, mean ± SD **Before therapy** **End of therapy**	-2.9 ± 1.3 -2.3 ± 0.9	-2.4 ± 1.6 -2.6 ± 1.2	0.61 0.89



Scientific Session I (cont.)

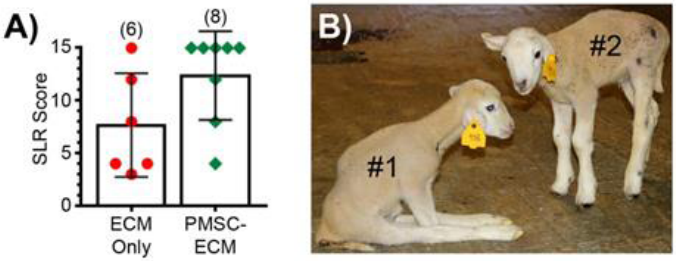


Figure 1. Comparison of hind limb neurologic function in lambs treated with placenta derived mesenchymal stromal cells (PMSCs) seeded on clinical grade Small Intestinal Submucosa – derived extracellular matrix (ECM) versus ECM alone. Sheep Locomotor Rating (SLR) scores were higher in the ECM-PMSCs treated lambs when compared to ECM only (A). Lamb #2 treated with ECM-PMSCs ambulated independently, but its twin lamb # 1 treated with ECM only was paralyzed (B).

Scientific Session II

Session II: Appendicitis, General Pediatric Surgery
Friday, May 5, 10:30 a.m. - Noon

21

POSTERIOR TRACHEOPEXY FOR SEVERE TRACHEOMALACIA ASSOCIATED WITH ESOPHAGEAL ATRESIA (EA): PRIMARY TREATMENT AT THE TIME OF INITIAL EA REPAIR VERSUS SECONDARY TREATMENT

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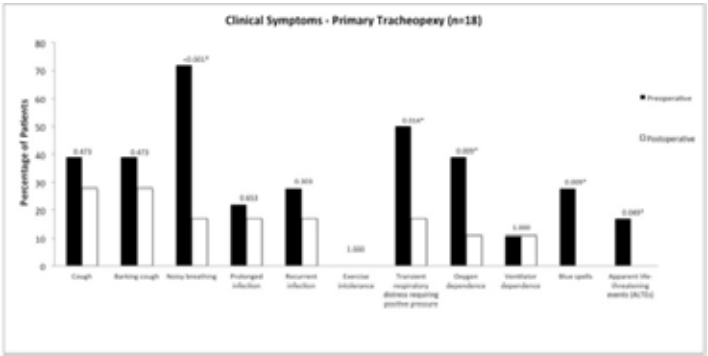
Purpose: In severe tracheomalacia, posterior tracheopexy improves airway patency by addressing posterior membranous tracheal intrusion. We review outcomes of posterior tracheopexy in esophageal atresia (EA) patients, comparing primary treatment at the time of initial EA repair versus secondary treatment, to determine if there were resolution of clinical symptoms and bronchoscopic evidence of improvement in airway collapse.

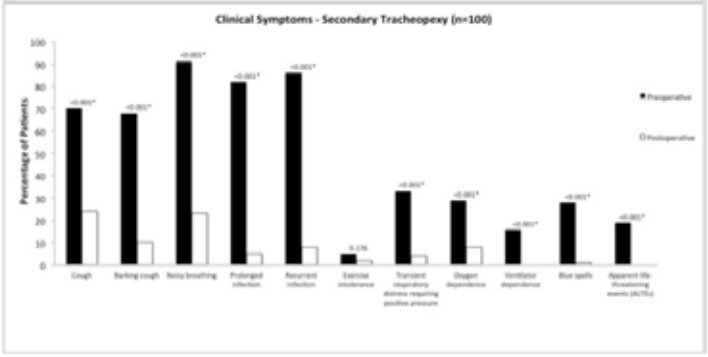
Methods: All EA patients who underwent posterior tracheopexy from October 2012 to September 2016 were retrospectively reviewed. Clinical symptoms, tracheomalacia scores based on standardized dynamic airway evaluation, and persistent airway intrusion were collected. Data were analyzed by Wald test, Wilcoxon signed-ranks test and multivariable Cox regression analysis.

Results: 118 patients underwent posterior tracheopexy at median (IQR) age 16 months (5-32), including 18 (15%) primary versus 100 (85%) secondary cases. 8% had a prior aortopexy. Median (IQR) age was 2 months (1-4) for primary (22% type C) and 18 months (8-40) for secondary (87% type C) cases ($p<0.001$). Median follow-up was 5 months (range 0.25-32). There were statistically significant improvements in most clinical symptoms postoperatively for primary and secondary cases (figure). Secondary cases had significantly more baseline preoperative cough ($p=0.012$), prolonged and recurrent respiratory infections ($p<0.001$), and exercise intolerance ($p=0.022$) than primary cases, however there were no significant differences in any postoperative symptoms between the two groups ($p>0.1$). Total tracheomalacia scores on bronchoscopy improved significantly in primary ($p=0.013$) and secondary ($p<0.001$) cases. 13% had persistent airway intrusion requiring reoperation, usually with aortopexy. Multivariable Cox analysis indicated no differences in reoperation between primary and secondary tracheopexy adjusting for imbalances in age and EA type ($p=0.67$).

Conclusions: Posterior tracheopexy is effective in treating severe tracheomalacia with significant improvements in clinical symptoms and degree of airway collapse on bronchoscopy. With no significant differences in outcomes between primary and secondary treatment, posterior tracheopexy should be considered at the time of initial EA repair.

Scientific Session II (cont.)





Scientific Session II (cont.)

22
WITHDRAWN

Scientific Session II (cont.)

23

EVALUATION OF A PROSPECTIVE SAME DAY DISCHARGE PROTOCOL FOR PEDIATRIC APPENDICITIS

Yangyang R. Yu, MD, Bindi J. Naik-Mathuria, MD, Sohail R. Shah, MD, Kimberly Ceyanes, PA-C, Jed G. Nuchtern, MD, Monica E. Lopez, MD.

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Purpose: This prospective cohort study assesses the impact of a same day discharge (SDD) protocol for simple appendicitis.

Methods: Pediatric patients (5-18 years) with intraoperative findings of acute or suppurative appendicitis from February to August 2016 were eligible for SDD. Those operated on weekdays from 7AM until 5PM had clinical discharge criteria assessed in PACU for up to 4 hours after surgery. Interval appendectomies, and patients with complex appendicitis, comorbidities or social requirements for admission were excluded. Educational pamphlets and standardized order sets were utilized. All SDD patients received telephone follow-up within 24 hours. PACU duration, length of stay (LOS), direct variable costs, 30-day ER visits and hospital readmissions were compared in SDD and non-SDD patients.

Results: 316 children met eligibility criteria for SDD (median 11.4 years [IQR 8.4-14.1]; 64% male) but only 118 appendectomies were performed weekdays 7AM-5PM. Seventy (59%) of these patients underwent SDD. Reasons for admission included: discharge criteria unmet (n=17, 35%), surgeon preference (n=11, 23%), parental refusal (n=5, 10%), and undocumented (n=15, 31%). Twenty-one patients with late or weekend surgeries underwent SDD. Overall, 91 (29%) patients were managed with SDD. SDD patients had longer PACU duration (4.0 vs. 1.1 hours, $p<0.001$), but shorter post-operative LOS (4.6 vs 18 hours, $p<0.001$) and overall LOS (17.9 vs. 30.6 hours, $p<0.001$). ER visits (SDD 5.8% vs. non-SDD 5.5%, $p=1.0$) and readmissions (SDD 1% vs non-SDD 3%, $p=0.68$) were similar. Of 50 (55%) phone call respondents, 46 (92%) reported well-controlled pain; 12 (24%) did not require narcotic pain medication. Thirty-seven (74%) parents reported satisfaction 10 out of 10. SDD protocol significantly lowered direct variable cost (median $3139 vs. $3473, $p<0.001$).

Conclusions: Safe and satisfactory outpatient management of pediatric simple appendicitis is achievable with appropriate patient selection. While PACU LOS increases, overall hospitalization and costs decrease. The impact of shifting resource allocations merits further study.

Scientific Session II (cont.)

24

NAVEL GAZING: PRACTICE VARIATION IN UMBILICAL HERNIA REPAIR IN CHILDREN DEMONSTRATES A NEED FOR CONSENSUS BEST PRACTICES

Tiffany Zens, MD[1], Andrew Rogers, MD[1], Randi Cartmill, MS[1], Peter F. Nichol, MD[1], Daniel J. Ostlie, MD[2], Jonathan Kohler, MD[1].

[1]University of Wisconsin, Madison, WI, USA, [2]Phoenix Children's Hospital, Phoenix, AZ, USA.

Purpose: Umbilical hernias occur in 15-21% of infants and spontaneously close by age 4 in 90% of cases. Although no formal practice guideline exists, experts recommend waiting until at least 2-3 years old for operative repair. This study aims to understand practice patterns with regards to timing of repair as well as the effect of timing on patient outcomes.

Methods: The Wisconsin State Ambulatory Surgery and Services database (SAS-D) was queried from 2012-2014 for children undergoing umbilical hernia repair. A retrospective chart review was also conducted for children from 2007-2015 undergoing hernia repairs at a Wisconsin children's hospital. Only uncomplicated hernia repairs performed as a single procedure were included. Umbilical hernia repairs were evaluated for patient age, patient demographics and patient outcomes.

Results: The SAS-D analysis included 1,449 patients at 98 hospitals and chart review included 204 patients. Statewide, 14.6% of hernia repairs were in children <2years, 33.6% 2-4 years and 51.8% >4 years. The studied children's hospital performed repairs in older children on average (12.3% <2 years, 23.5% 2-4 years and 64.2% >4 years). The most common reason for early repair was a large defect (41%) although documented defect size decreased significantly with time ($p<0.001$). Over 90% of hernias were asymptomatic. Postoperative complications were higher ($p=0.034$) in the children <4 years (12.3%) compared to >4years (3.1%). All respiratory complications and readmissions were in children <4 years old. State-wide the highest surgical charges were for children <2 years.

Conclusions: There is marked variation in the timing of umbilical hernia repair in children. Since hernias may resolve over time and can safely be monitored with watchful waiting, consensus guidelines may support delayed repair. Such consensus could prevent unnecessary operations and complications related to surgery and anesthesia.

Scientific Session II (cont.)

25

RISK-ADJUSTED COMPARISON OF OPERATIVE AND NON-OPERATIVE MANAGEMENT FOR PERFORATED APPENDICITIS IN CHILDREN: IMPACT OF INITIAL TREATMENT APPROACH ON OVERALL COST

Mubina Isani, MD, Jeremy R. Jackson, MD, Jordan Bowling, MD, Grace Asuelime, MS, Alberto Chiccone, GED, Choo Phei Wee, MS, James E. Stein, MD, MS, Aaron R. Jensen, MD, MEd, Eugene S. Kim, MD.

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Purpose: Management of perforated appendicitis remains controversial. Non-operative and immediate operative strategies are employed. We hypothesize that initial non-operative management is associated with higher overall costs and worse outcomes compared to immediate operation.

Methods: Following IRB approval, patients with appendicitis between 2012-2015 underwent chart review. Patients with perforated appendicitis were determined by operative findings and histology. Both treatment groups were placed on standardized treatment pathways. The immediate operative group underwent appendectomy within 24 hours of admission. Non-operative management was determined by individual surgeon preference. Organ failure, VP shunts and initial treatment at outside facilities were exclusion criteria. Univariate analysis was performed as well as a multivariate regression to analyze the effect of treatment modality on cost, adjusting for factors that may bias surgeons toward non-operative management (days of symptoms, CRP, WBC, age, presence of abscess on imaging).

Results: 726 patients were identified: 597 underwent immediate operation, 98 were treated with intent of non-operative management, and 31 were excluded. By univariate analysis, non-operative patients incurred higher overall costs ($15,407 vs $8592), longer LOS (10 vs 5 days), greater readmissions (88% vs 5.4%), complications (43.8% vs 9.7%), PICC lines (77.5% vs 6.4%), IR drains (50.6% vs 4.4%), and ED visits (41% vs 6%)(all $p<0.0001$). By multivariate analysis and adjusting for days of symptoms, presence of abscess, admission CRP, admission WBC, and age, non-operative management was independently associated with increased costs (OR 1.55, 1.33-1.80, $p<0.0001$).

Conclusions: Our study shows that non-operative management of perforated appendicitis is independently associated with higher overall costs, total length of stay and complications compared to immediate operation. Immediate operation for perforated appendicitis should be performed when possible.

Scientific Session II (cont.)

Univariate analysis comparing non-operative patients to immediate operative patients.			
	Operative (n=597)	**Non-Operative (n=98)**	**p-value**
Costs	$8,592.90 ($11,468.96- $21,820.05)	$15,329.53 ($6,336.13-$10,358)	<0.0001
Total Length of Stay (days)	5 (3-6)	10 (7-15)	<0.0001
Readmission (# patients)	32 (5.4%)	79 (80.6%)	<0.0001
Complications (# patients)	58 (9.7%)	45 (45.9%)	<0.0001
PICC line (# patients)	38 (6.4%)	73 (74.5%)	<0.0001
IR Drain (#patients)	26 (4.3%)	48 (49.0%)	<0.0001
ED Visit (# patients)	40 (6.6%)	36 (36.7%)	<0.0001
UrgentClinic Visits (# patients)	13 (2.2%)	17 (17.4%)	<0.0001

Scientific Session II (cont.)

26

SAME DAY DISCHARGE AFTER APPENDECTOMY IN PEDIATRIC PATIENTS IS NOT ASSOCIATED WITH INCREASED UNANTICIPATED HOSPITAL REVISITS

Sarah B. Cairo, MD, MPH[1], Marybeth Browne, MD, MS[2], Mehul V. Raval, MD, MS[3], Holly Meyers, Clinical Reviewer[1], David H. Rothstein, MD, MS[1].

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Tweet about it: Is "Same-Day Discharge After Appendectomy" safe or are we jumping the gun?

Purpose: To evaluate the influence of same-day-discharge on 30-day readmission and wound complication rates following appendectomy for acute appendicitis in pediatric patients.

Methods: The National Surgical Quality Improvement Program-Pediatric (NSQIP-P) database (2012-2014) was queried for patients who underwent appendectomy for uncomplicated appendicitis. Patient and operative variables, as well as timing of discharge, were assessed. Same-day discharge was defined as zero days between surgery and discharge and was compared to patients discharged within two days of surgery (post-operative day 1 or 2). The primary outcome examined was 30-day readmission. Secondary outcomes included surgical site infections and other wound complications. Forward stepwise logistical regression models were used to identify variables associated with outcomes of interest.

Results: From 2012-2014, 15,534 patients were identified as having acute appendicitis without peritonitis or perforation. Of these patients, 2,918 (18.8%) were discharged on the same day as surgery and 11,515 (74.1%) were discharged within 2 days of surgery. There was no difference in the odds of readmission for patients with same-day-discharge compared to those discharged within two days (adjusted odds ratio = 0.87, 95% Confidence Interval 0.61-1.10, with 3.36% vs 3.37% readmission, respectively). There was no significant difference in reason for readmission based on discharge timing. The most common reasons for readmission, superficial wound complications and factors unrelated to surgical procedure, did not vary with statistical significance between the two groups. No patient or operative variables, including obesity, diabetes, laparoscopic approach and day-of-discharge were associated with wound complications or readmission.

Conclusions: In pediatric patients with acute, non-perforated appendicitis undergoing appendectomy, same-day-discharge is not associated with an increase in 30-day hospital readmission rates or wound complications when compared to discharge in 1 or 2 days. Same-day-discharge may be an applicable quality indicator for pediatric patients with acute, non-perforated appendicitis.

Scientific Session II (cont.)

27

THE NUSS PROCEDURE: ADVANCES IN PAIN MANAGEMENT; MOVING TOWARDS ROUTINE DISCHARGE ON FIRST POST-OPERATIVE DAY

Long Nguyen, MD[2], **Marc G. Schlatter, MD**[1], Tedi Vlahu, MD[2], Maria Tecos, BS[3], Elle Kalbfell, BS[3], Omar Gonzalez-Vega, BS[3].

[1]Spectrum Health, Helen DeVos Children's Hospital, Grand Rapids, MI, USA, [2]Grand Rapids Medical Education Partners, Grand Rapids, MI, USA, [3]Michigan State University, College of Human Medicine, Grand Rapids, MI, USA.

Purpose: Pectus excavatum is the most common chest wall deformity seen in the pediatric population. The Nuss procedure has become the most commonly used technique for surgical correction but has been associated with significant post-operative pain and prolonged hospital stays. This study aims to highlight changes in our post-operative pain management over the years that led to significantly decreased average length of stay (LOS) compared to what is reported in the literature.

Methods: We retrospectively reviewed charts from a single surgeon's experience with the Nuss procedure at a single institution, from 2001-2016. Post-operative LOS was defined as time from when surgery ended to placement of discharge order. Comparisons between any two groups were done with Student's t-test and comparison of means amongst multiple groups was done by ANOVA. Statistical significance was assessed at p &lt 0.05.

Results: A total of 198 patients were reviewed from 2001-2016 and stratified into three groups based upon differences in pain management provided over time. The first group (2001-2006) received primarily epidurals (EP); The second group (2007-2010) received primarily patient controlled analgesia (PCA) in addition to bilateral intercostal nerve blocks (IB); the third group (2011-2016) received IB and scheduled oral pain medication (SOM) after surgery (IB/SOM). The average LOS in hours was 99.1 in EP group; 66.2 in PCA/IB group; and 45.3 in IB/SOM group, and these differences were statistically significant (p &lt 0.001). In addition, average LOS for patients undergoing surgery in 2016 was 23.6 hours.

Conclusions: Deviating from reported literature, our data demonstrates significantly shorter LOS in patients who receive intercostal nerve blocks and scheduled oral pain regimen. Given the marked improvement in recovery and earlier discharge from the hospital, we anticipate that further advancements in pain management may even lead to the Nuss procedure becoming an outpatient surgery.

Scientific Session II (cont.)

28

PROSPECTIVE OBSERVATIONAL STUDY TO ASSESS THE NEED FOR POSTOPERATIVE ANTIBIOTICS FOLLOWING SURGICAL INCISION AND DRAINAGE OF SKIN AND SOFT TISSUE ABSCESS IN PEDIATRIC PATIENTS

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Purpose: Skin and soft tissue infection (SSTI) requiring surgical incision and drainage (I&D) is ubiquitous in pediatric surgery. However, there is significant variation in the role of post-operative antibiotics. We propose that antibiotics are unnecessary following I&D.

Methods: Patients were prospectively recruited from a freestanding children's hospital. Inclusion criteria were SSTI of the buttocks, groin and/or thigh in patients aged 3 months to 6 years who required I&D. Exclusion criteria were signs of systemic illness, concurrent antibiotic therapy for another illness and area of induration greater than 5 cm. The primary outcome was the proportion of patients requiring re-drainage and/or a course of antibiotic for SSTI recurrence, at the identical location, within 30 days of discharge. Follow-up consisted of a 2-week office visit and 30-day phone call. Patient charts were also reviewed for contact with other healthcare providers. One-sample binomial proportion test was used to construct 95% confidence intervals (CI) and a non-inferiority analysis was performed using previously published success rates for patients receiving antibiotics post-operatively (95.9%, with a 7% margin of equivalence).

Results: A total of 92 patients (58 females, 63%) were enrolled, with average age 1.8 years (range 0.5 - 5.8 years). The most frequent abscess location was the buttocks (71, 77%). All patients received pre-operative antibiotics. There was one abscess recurrence, which required I&D (success rate 0.989, CI 0.941 - 0.999). The recurrence rate of SSTI for patients in this study was at least as good as that for those who received post-operative antibiotics ($p < 0.001$). The same analysis was performed on the subset of 37 patients (40%) who completed 30-day follow-up. There was a success rate of 0.973, CI 0.858 - 0.999 and evidence of non-inferiority ($p = 0.04$).

Conclusions: Post-operative management excluding antibiotics should be considered for patients who undergo I&D for SSTI.

Scientific Session II (cont.)

29

THE UTILITY OF ERCP IN PEDIATRIC PANCREATIC TRAUMA

Eric H. Rosenfeld, MD[1], Denise B. Klinkner, MD, MEd[2], Stephanie Polites[2], Mauricio Escobar, MD[3], Adam Pattyn, MD[3], Barbara Gaines, MD[4], Christine Leeper, MD[4], Ankush Gosain, MD, PhD[5], Laura V. Veras, MD[5], Robert Russell, MD,MPH[6], Ilan Maizlin, MD[6], Brendan Campbell, MD, MPH[7], Shefali Thaker, MD[7], Hale Wills, MS, MD[8], Alexis Smith, MD[8], Anthony Stallion, MD[9], Megan Waddell[9], Shawn St. Peter, MD[10], David Juang, MD[10], Rajan Thakkar, MD[11], Joseph Drews, MD[11], Adam Vogel, MD[12], Rita V. Burke, PhD, MPH[13], Michael Malicote, MD[13], James Gilmore, MD[14], Mubeen Jafri, MD[14,22], David Mooney, MD, MPH[15], Lindsey Armstrong, MD[15], Randall Burd, MD, PhD[16], Stephen J. Fenton, MD[17], Marianne Beaudin, MD[18], Laurence Carmant[18], Richard A. Falcone Jr., MD[19], MPH, Suzanne Moody[19], Nathaniel Kreykes MD[20], Heidi Vander Velden, MS[20], Jose M. Prince[21], MD, Ibrahim Abd el-shafy, MD[21], Brandon Behrens, MD[22], Bindi J. Naik-Mathuria, MD[1].

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Purpose: Endoscopic retrograde cholangiopancreatography (ERCP) is sometimes used for management of pediatric pancreatic injuries. Our purpose was to evaluate outcomes following ERCP for these rare injuries among a large cohort.

Methods: A retrospective review of 128 pancreatic injuries (grades II-IV) managed at 22 trauma centers between 2010-15 was performed, following IRB approval at all sites. ERCP details and outcomes were collected and analyzed using descriptive statistics and Wilcoxon rank tests; $p<0.05$ was considered significant.

Results: ERCP was used at 14/22 centers for 20 patients treated with non-operative management (NOM) and 6 patients with operative management (OM). Median age was 11 years (range 2-18) and median time to ERCP was 3 days after admission (range 0-45). 38% had pancreatic head injuries. Indications were diagnostic (4) and therapeutic (22): duct leak control/pseudocyst (13), fistula (2), worsening symptoms/labs (5), stricture (2). Diagnostic ERCP resulted in management change in 4/4 (3 had OM, 1 downgraded). Stent placement at duct transection site (DTS) was only possible in 8/22, 8 were placed at the ampulla, and 6 had concomitant sphincterotomy. Therapeutic success was noted in 36%: leak control in 3/8 DTS stents and 2/8 ampulla stents, stricture relief in 2/2, and fistula resolution in 1/2. Of the 94 patients with pancreatic

Scientific Session II (cont.)

body injuries treated with NOM, therapeutic ERCP+stent was only employed in 8 (5.5%) and the rest were observed. Comparison of ERCP/stent (intervention) and observation-only patients revealed no significant differences in time to regular diet [median days I:14 n=5 vs O:8 (n=74)], hospital stay [median days I:21 n=8 vs O:12 (n=86)], or TPN use [I: 68% n=8 vs O:75% (n=76)].

Conclusions: ERCP can be useful to diagnose duct injury when imaging is unclear and for stricture relief, but the utility of stent placement to attempt duct leak control in NOM of pancreatic body injuries may be of limited value.

Scientific Session II (cont.)

30

EXPANDING THE INCLUSION CRITERIA FOR NON-OPERATIVE MANAGEMENT OF UNCOMPLICATED APPENDICITIS: OUTCOMES AND COST

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Purpose: Carefully selected children with early appendicitis may be managed non-operatively; however, it is unknown whether non-operative management (NOM) is applicable to all patients with uncomplicated appendicitis. The purpose of this study was to prospectively evaluate the outcomes of NOM of uncomplicated appendicitis with expanded inclusion criteria.

Methods: A prospective, non-randomized patient-preference study comparing NOM versus laparoscopic appendectomy (LA) was performed in children with ≤5 days of symptoms and radiographic/clinical evidence of uncomplicated appendicitis. Outcomes included initial failure rate, rate of complicated appendicitis, length of hospitalization, days to normal activity, days of pain medication, quality of life (30 days), recurrent appendicitis, and estimated cost.

Results: Baseline demographics, laboratory values, and clinical presentation were similar between the NOM(n=33) and LA(n=18) groups. The initial failure rate was 24%(8/33). The outcomes (Table) were similar between groups except NOM had shorter time to normal activity and fewer days of pain medication. Of those who failed NOM, 5(63%) had complicated appendicitis (3-contained perforation; 2-gangrenous). Patients who failed NOM had a longer duration of symptoms prior to admission(48 vs. 24 hours, p=0.02). Patients with an appendicolith had a failure rate of 50%(3/6) compared to 19%(5/27) without an appendicolith. The recurrence rate was 28%(7/25); all were uncomplicated appendicitis. Overall, 55%(18/33) avoided appendectomy. Cost modeling based on these data predicted similar costs between NOM($13,876) and LA($13,163).

Conclusions: When expanding the inclusion criteria for children with non-perforated appendicitis, NOM was associated with high failure and recurrence rates. These high rates may be due to the inclusion of patients with complicated appendicitis and patients with an appendicolith. Even in this setting of less-restrictive exclusion criteria, NOM remained cost neutral.

Scientific Session II (cont.)

Data are shown as median [interquartile range] or as number [percent]

	NOM (n=33)	LA (n=18)	p
Age	10 [7,13]	10 [8,14]	0.94
WBC (x103 per ul)	15.1 [13.4,17.7]	14.8 [13.1,18.6]	0.98
Pediatric Appendicitis Score	7 [5,7]	7 [6,7]	0.62
Morbidity	2 (6%)	1 (6%)	1.00
Days of Hospitalization	2 [1,2]	1 [1,3]	0.82
Days of Pain Medication	0 [0,2]	3 [2,7]	0.04
Days to Normal Activity	3 [1,5]	7 [3,7]	0.01
QOL Score (30 days)	100 [99,100]	100 [98,100]	0.59
Estimated Cost	$13,876	$13,163	NS

Scientific Session II (cont.)

31

A PEDIATRIC APPENDICITIS PATHWAY THAT INCLUDES ANTIBIOTIC THERAPY AND/OR SURGERY RESULTS IN IMPROVED PERFORATION AND NEGATIVE APPENDECTOMY RATES WHILE DECREASING THE RATES OF UNNECESSARY CT AND SURGERY

Sidney M. Johnson, MD, Devin P. Puapong, MD, Russell K. Woo, MD.
Kapiolani Medical Center for Children, Honolulu, HI, USA.

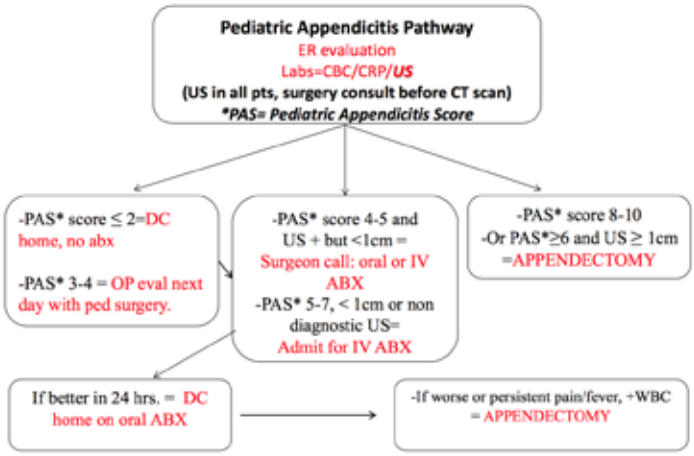
Background: Widespread CT use in the evaluation of pediatric appendicitis has been criticized due to radiation exposure. Additionally, newer data indicate that antibiotic treatment outcomes are equivalent to surgery in select pediatric appendicitis patients. We thus sought to combine established diagnostic and treatment modalities into a medical/surgical treatment pathway as a quality improvement initiative.

Methods: We started with an established diagnostic scoring system and then overlaid what we understood to be best practices in imaging, medical therapy and surgery for pediatric appendicitis. We implemented the pathway prospectively for a year and then compared the outcomes to two previous years.

Results: Prior to implementation of the protocol, 33% of ER patients with appendicitis typical abdominal pain were treated with appendectomy; after implementation 32.5% of these patients were treated with either antibiotics or surgery for appendicitis (p=NS). The appendectomy rate was 33% (204/619) prior to implementation of the pathway and dropped to 23% after implementation (96/419, $p<0.00001$) with 50 patients initially treated with antibiotics. The protocol resulted in a reduction in CT scanning (pre 39% vs. 11%, $p<0.00001$) while the use of US increased (pre 30% vs. 53%, $p<0.00001$). The appendiceal perforation rate, negative appendectomy and surgery rates for appendicitis all decreased significantly ($p<0.00001$). Of the 50 patients treated with antibiotics for appendicitis, 10 crossed over to surgical therapy without undue morbidity. Rates of perforation in the early antibiotic group were significantly lower than the surgical group ($p<0.00001$).

Conclusion: The use of a diagnostic and therapeutic protocol allows for early antibiotic therapy without increasing morbidity in appendicitis. Adherence to a medical/surgical treatment protocol that reserves surgery for clinically advanced appendicitis results in a reduction in CT scanning, perforation rates, negative appendectomy rates and overall surgery for appendicitis.

Scientific Session II (cont.)



Scientific Session III

Scientific Session III: Trauma, Reproductive, GI
Friday, May 5, 12:15 – 1:30 p.m.

32

SCLEROTHERAPY FOR THE MANAGEMENT OF RECTAL PROLAPSE IN CHILDREN

Scott C. Dolejs, MD, Justin Sheplock, BS, Robert J. Vandewalle, MD, **Matthew P. Landman, MD, MPH**, Frederick J. Rescorla, MD.
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Purpose: Rectal prolapse is a commonly occurring and usually self-limited process in children. Surgical management is indicated for failures of conservative management; however, the optimal approach is unknown. The purpose of this study is to determine the efficacy of sclerotherapy for the management of rectal prolapse.

Methods: This was a retrospective review of children <18 years with rectal prolapse who underwent sclerotherapy, predominantly with peanut oil, between 1998 and 2015. Patients with imperforate anus or cloaca abnormalities, Hirschprung's disease, or prior pull-through procedures were excluded.

Results: A total of 57 patients were included with a median age of 4.9 years (interquartile range (IQR) 3.2-9.2) and median follow-up of 51.9 months (IQR 7.6-91.0). Twenty-one patients (n=21/57; 36.8%) recurred at a median of 1.6 months (IQR 0.9-3.6). Only 3 patients experienced recurrence after 4 months. Nine of the patients who recurred (9/21; 42.9%) were re-treated with sclerotherapy. This was successful in 4 patients. Forty patients were thus cured with sclerotherapy alone (n=40/57; 70.2%). No patients undergoing sclerotherapy had an adverse event. Fourteen patients (n=14/21; 66.7%) underwent rectopexy after failing at least one treatment of sclerotherapy. Two of these patients (2/14; 14.3%) failed following rectopexy, with one requiring sigmoidectomy and one responding to repeat sclerotherapy. Two additional patients were identified that underwent initial primary rectopexy; one recurred and required sigmoidectomy for successful treatment.

Conclusions: Injection sclerotherapy for children with rectal prolapse resulted in a durable cure of prolapse in most children. Patients who recur following sclerotherapy tend to recur within 4 months. Another attempt at sclerotherapy following recurrence is reasonable and was successful 44% of the time. Sclerotherapy should be the preferred initial treatment for rectal prolapse in children and for the initial treatment of recurrence.

Scientific Session III (cont.)

33

PRIMARY OR REDO PSARP WITHOUT A STOMA: TO FEED OR NOT TO FEED?

Alessandra Gasior, DO, Carlos A. Reck, MD, Victoria A. Lane, MD, Claire Skerritt, MD, Andrea Wagner, CPNP-PC, Alejandra Vilanova, MD, Alexander J.M. Dingemans, BSc, Nicole Jenkins, ANP, Richard J. Wood, MD, Marc A. Levitt, MD.

Nationwide Children's Hospital, Columbus, OH, USA.

Introduction: Repair of anorectal malformations (ARM), primary or redo, may be performed in certain circumstances without a diverting stoma. In the immediate postoperative period, passage of bulky stool can lead to wound dehiscence and anastomotic disruption. To avoid this some surgeons keep patients NPO for a prolonged period postoperatively; however this can be difficult for young children and lead to raised parental anxiety. We report the results of a change to our routine postoperative care (NPO for 7 days) to a new protocol allowing children clear oral fluids/breast milk in the immediate postoperative period.

Methods: Children undergoing correction of ARM, primary or redo, at our institution and given clears were compared to a group of patients that were kept NPO. Age, indication for surgery, incision type, use of a PICC line postoperatively, and postoperative wound complications were recorded.

Results: There were 14 primary and 21 redo cases. Before the change 9 (45%) of patients had a PICC line for IV access vs 2 (13%) ($p = 0.008$) afterwards. NPO patients had their first bowel movement on average 2.2 days post-op vs 1.6 days for patients on clears ($p = 0.08$) The incidence of skin edge wound dehiscence was the same in both groups: 3 (15%) cases before institution of the protocol and in 2 (13%)($p=0.446$) after. If after 5 days no wound separation was noted, diet was advanced as tolerated. No mucosal retraction or stricture was present in any case in either group, nor was any operative intervention required

Discussion: No increase in wound problems were noted in children receiving clears or breastmilk as compared to the strict NPO group. The use of PICC lines was also reduced. We believe this change in practice simplifies post operative care without increasing the risk of wound complications.

Scientific Session III (cont.)

34

VARIABILITY OF CHILD ACCESS PREVENTION LAWS AND PEDIATRIC FIREARM INJURIES

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Purpose: State-level Child Access Prevention (CAP) laws impose criminal liability on adults who negligently allow children access to firearms. CAP laws can be further divided into those that impose criminal liability for negligently stored firearms and those that prohibit adults from intentionally, knowingly and/or recklessly providing firearms to a minor. The purpose of this study was to measure the association of specific CAP laws and the risk of intentional, unintentional and self-inflicted pediatric firearm injuries.

Methods: We constructed a cross-sectional national study using the HCUP-Kids Inpatient Database from 2006 and 2009 using weighted counts of firearm related admissions among children <18 years. Poisson regression was used to estimate the association of specific CAP laws with the risk of pediatric firearm injuries.

Results: A total of 6,843 pediatric firearm injuries occurred in the US during 2006 and 2009 (4.63 per 100,000 children). Assaults (n=4,810, 70%) were the most common type of pediatric firearm injury followed by unintentional (n=1,756, 26%) and self-inflicted (n=208, 3%). After adjusting for race, sex, age and socioeconomic income quartile, CAP laws imposing criminal liability for negligent storage were associated with a significant reduction in any, self-inflicted and unintentional pediatric firearm injuries (Table 1). Conversely, CAP laws that impose liability for reckless endangerment were associated with an increased risk of all pediatric firearm injuries.

Conclusions: There is a significant discordant association of Child Access Protection laws on the incidence of pediatric firearm injuries whether a state adopted a negligent storage or reckless endangerment law. Implementation of negligent storage Child Access Protection law by each state has the potential to significantly reduce pediatric firearm injuries.

Adjusted rate comparison between Child Access Protection (CAP) laws and pediatric firearm injuries

	All	**Self-inflicted**	**Unintentional**	**Assault**
CAP law	IRR (95% CI)	IRR (95% CI)	IRR (95% CI)	IRR (95% CI)
None	Ref			
Negligent Storage	.70 (.52, .93)	.46 (.27, .79)	.56 (.43, .74)	.77 (.54, 1.09)
Reckless Endangerment	1.79 (1.32, 2.44)	1.82 (1.03, 3.23)	1.7 (1.29, 2.25)	1.78 (1.19, 2.67)

Scientific Session III (cont.)

35

A MULTICENTER PROSPECTIVE ANALYSIS OF HIGHEST LEVEL TRIAGE EFFICACY IN PEDIATRIC PATIENTS FOLLOWING BLUNT ABDOMINAL TRAUMA

Regan Williams, MD[1], Adam M. Vogel, MD[2], Richard A. Falcone, MD, MPH[3], Melvin S. Dassinger, MD[4], Jeffrey H. Haynes, MD[5], Eunice Y. Huang, MD, MS[1], Patrick Mauldin, PhD[6], David Mooney, MD, MPH[7], Bindi Naik-Mathuria, MD[8], Robert T. Russell, MD, MS[9], Matthew Santore, MD[10], Shawn D. St. Peter, MD[11], Kuojen Tsao, MD[12], Jeffrey S. Upperman, MD[13], Renaldo Williams, MD[14], Jingwen Zhang, MS[6], Christian J. Streck, MD[6].

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Background: Trauma center activation criteria are designed to triage patients to ensure appropriate allocation of resuscitation resources. We hypothesized that triage of pediatric patients following blunt abdominal trauma(BAT) would result in under triage of greater than the goal of 5%.

Methods: Children(<16 years of age) were prospectively enrolled following BAT at 14 Level-One Pediatric Trauma Centers over 1 year. Patients were excluded who presented >6 hours after injury, underwent prior abdominal CT, or had isolated head or extremity trauma. Overtriage and undertriage rates for trauma activations were calculated using the Cribari matrix method. In this analysis, "serious injury" was defined in 3 different ways: injury severity score(ISS)>15, intensive care unit(ICU) admission, and use of a critical resource.

Results: The study included 2188 patients; mean age 8 years, median ISS 8, mortality 1.8%. Overall, 17% had ISS>15, 21% required ICU admission, 17% required early critical resource(s), 12% had an intra-abdominal injury(IAI) and 3% had IAI requiring intervention(IAI-I). Seventeen percent of patients were triaged at the highest level activation. Overtriage rates were 52%, 29% and 50% when using ISS>15, ICU admission or critical resource as the definition of "serious injury" while undertriage rates were >10% for each definition Approximately half of all seriously injured children were not triaged to the highest level activation(Table 1) and almost half of the highest level trauma activations involved patients without serious injury.

Conclusions: Regardless of outcome used to define "serious injury", children following BAT were often inappropriately triaged. Efforts should be focused on identifying high performing centers and standardizing triage criteria to improve resource allocation.

Scientific Session III (cont.)

Triage efficacy

	Level 1 Activation	**Level 2/ consult**
ISS>15	166	168
ICU admission	272	190
CriticalResource *	191	177
IAI	78	181
IAI-I**	35	33

* intubation, hemothorax, pneumothorax, ICP monitor, spinal cord injury, transfusion, angioembolization, emergent non-orthopedic surgery, 30 day mortality

** surgery for abdominal trauma, angioembolization, transfusion for IAI

Scientific Session III (cont.)

36

THE SAFETY AND EFFICACY OF OVARIAN TISSUE CRYOPRESERVATION IN YOUNG FEMALES WITH CANCER

Jeffrey R. Lukish, MD, Mindy Christianson, MD, Dominic J. Papandria, MD, Amany Isaac, MD, Howard Pryor, MD, Fizan Abdullah, MD, PhD, Heather Symons, MD, Kathy Ruble, PhD.

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Purpose: Cancer therapy in young females results in irreversible damage to their ovaries potentially leading to premature ovarian failure (POF) and infertility. The specific aim of this study was to assess the feasibility, safety and efficacy of a strategy to procure, cryopreserve and xenotransplant human adolescent ovarian tissue in young females with cancer.

Methods: A IRB approved prospective human and animal trial enrolling six girls (ages 6 to 18 years) with cancer at high risk for POF was initiated. Each girl would undergo left hemi-oopherectomy at the time of tunneled central venous catheter placement. The ovarian tissue would be allocated as follows: 1. Immediate pathologic analysis; 2. Cryopreserve for future use by child; 3. Immediate xenotransplantation into SCID mice; 4. Cryopreserved (90 days) followed by xenotransplantation into SCID mice. Analysis of standard surgical outcomes; viability of the residual left ovary by ultrasound and viability of the xenografts after a 30 day engrafment would be performed.

Results: All six of the girls underwent the procedure uneventfully without complications. The average operative time was 28 minutes +/- 9 minutes. The residual left ovary was normal on post operative ultrasound. The xenografts resulted in viable ovarian tissue in all children. (Table 1)

Conclusions: Ovarian cryopreservation in a high risk group of girls with cancer can be performed with outstanding surgical outcomes. Hemi oopherectomy can be performed safely resulting in viable ovarian tissue following cryopreservation. This study establishes a minimal risk strategy of cryopreservation of ovarian tissue in girls that is feasible, safe and efficacious. By providing an evidence base for future practice the potential benefit to the young female with cancer is significant.

Table 1: Ovarian Cryopreservation Data

N	Age (yrs) Enrolled	Current Age (yrs)	Diagnosis	Complications/ Ultrasound	Xenografts
1	13	18	Hodgkins	None/Normal	Viable
2	16	20	Hodgkins	None/Normal	Viable
3	7	10	Sarcoma	None/Normal	Viable
4	6	9	Sarcoma	None/Normal	Viable
5	17	19	Hodgkins	None/Normal	Viable
6	13	14	Hodgkins	None/Normal	Viable

Scientific Session III (cont.)

37

USING QUALITY IMPROVEMENT METHODOLOGY TO IMPROVE OVARIAN SALVAGE FOR BENIGN OVARIAN MASSES

Jennifer H. Aldrink, MD[1], Stephen P. Sales, MBA[2], Katherine J. Deans, MD, MHSc[1], Gail E. Besner, MD[1], Geri D. Hewitt, MD[1].

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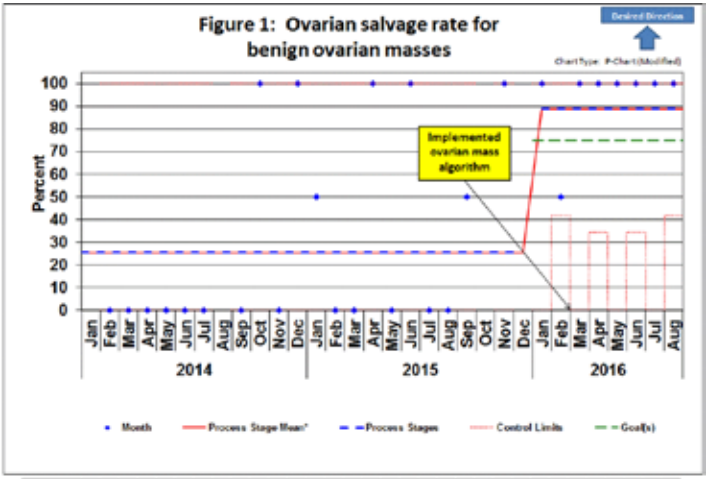
Purpose: The majority of ovarian masses in children and adolescents are benign, and with appropriate preoperative risk stratification, may be amenable to ovarian salvage surgery (OSS). However, despite the common use of OSS among pediatric adolescent gynecologists in recognition of the associated reproductive and hormonal health advantages, this technique is not commonly performed by pediatric surgeons. The aim of this quality improvement (QI) initiative was to improve our institutional rate of OSS performed for benign ovarian masses.

Methods: Baseline data were obtained retrospectively from surgical procedures performed for benign ovarian masses between January 2012 and February 2016. Procedures performed for simple cysts and adnexal torsion were excluded. Designed interventions to improve the rate of OSS included the development of an institutional multidisciplinary adnexal mass algorithm, standardization of radiologic interpretation of pelvic ultrasounds, monthly multidisciplinary analysis of all ovarian procedures performed, and implementation of a co-surgeon training model for technical guidance in performing successful OSS. Procedures performed for benign ovarian masses from March 2016 to August 2016 comprised the process stage.

Results: There were 128 patients included in the analysis. Our institutional baseline OSS rate was 25.5%. Since implementation of the institutional algorithm, no oophorectomies have been performed for benign lesions, increasing the overall OSS rate to 88.2% as indicated by a sustained shift in the process (Figure 1). One patient required a second operation, but not for lesion recurrence. There have been no missed ovarian malignancies.

Conclusions: Utilizing QI methodology and multidisciplinary collaboration between pediatric surgery and pediatric adolescent gynecology, the OSS rate at our institution for benign adnexal lesions has significantly improved. OSS can be safely performed with a low concern for malignancy based upon preoperative risk stratification. We are currently collaborating on a multi-institutional QI initiative to broaden this practice to other children's hospitals.

Scientific Session III (cont.)



OSS		0	0	0	0	0	0		0	1	0	1	1	0	0	1	0	1	0	0	1		2		1	2	1	3	1	3	1	4
Benign Neoplasm Ds		1	1	1	2	3	2		1	1	1	1	2	1	1	1	1	1	2	3	2		2		1	4	1	3	1	3	1	4

Scientific Session III (cont.)

38

VALIDATION OF THE AGE-ADJUSTED SHOCK INDEX USING PEDIATRIC TRAUMA QUALITY IMPROVEMENT PROGRAM DATA

Andrew Nordin, MD[1], Alan Coleman, MD[1], Junxin Shi, MD, PhD[1], Krista Wheeler, MS[1], Shannon Acker, MD[2], Huiyun Xiang, MD, PhD[1], Denis Bensard, MD[3], Brian Kenney, MD, MPH[1].

[1]Nationwide Children's Hospital, Columbus, OH, USA, [2]University of Colorado School of Medicine, Aurora, CO, USA, [3]Children's Hospital Colorado, Aurora, CO, USA.

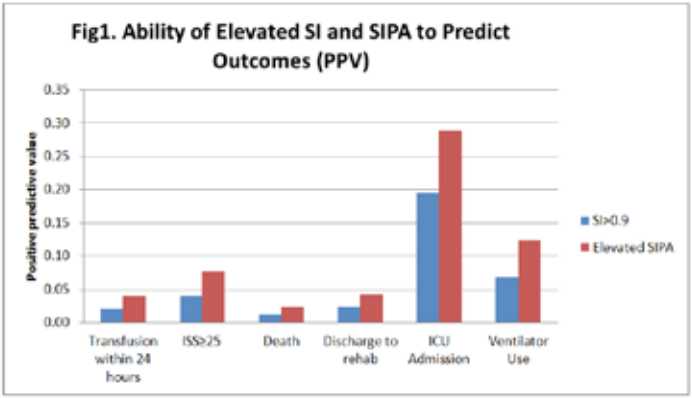
Purpose: Trauma is a leading cause of death in children and adolescents, and several scoring systems are available to quantify injury severity, predict outcomes and determine triage. In adults, shock index (SI; heart rate/systolic blood pressure) >0.9 accurately predicts injury severity and outcomes. However, age-adjusted shock index (SIPA) has been shown to be a better predictor in children 4-16 years old sustaining blunt trauma. We sought to confirm these findings in a larger patient population and expand this tool to include children aged 1-4 years.

Methods: We developed SIPA cutoff values for patients aged 1-4 years using maximal normal heart rate and minimal normal systolic blood pressure based on age. 2013 Pediatric Trauma Quality Improvement Program (TQIP) data was queried for all patients aged 1-16 who sustained blunt traumatic injuries; no IRB approval was needed since these data are de-identified. We evaluated ISS, transfusion within 24 hours, ICU and hospital length of stay (LOS), ventilator days and mortality. The efficacy of SIPA versus SI was compared using Student's t-test to a 0.05 significance level.

Results: A total of 22,344 patients sustaining blunt trauma were identified. Elevated SI was found in 9,222 patients, and elevated SIPA was found in 3,485 patients (41.3% and 15.6% respectively). Compared to SI, SIPA more accurately predicted transfusion needs, ISS >25, ICU admission, ventilator use, ICU and hospital LOS and overall mortality. Across these outcomes, SIPA demonstrated higher specificity and positive predictive values than SI (Figure 1).

Conclusion: Our results confirm that SIPA effectively identifies severe injury in pediatric blunt trauma patients, including patients aged 1-4 years. Given its increased predictive value over SI, SIPA should aid in effectively allocating resources and determining admission disposition. Further investigation should evaluate its use as a triage tool.

Scientific Session III (cont.)



Scientific Session III (cont.)

39

THE ROLE OF TLR-4 IN THE PATHOGENESIS OF TRAUMATIC BRAIN INJURY IN MICE

Jose C. Alonso-Escalante, MD[1], Diala F. Hamade, MS[2], William Fulton, MS[1], Chhinder P. Sodhi, PhD[1], David J. Hackam, MD, PhD[1], Isam W. Nasr, MD[1].

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Purpose: Traumatic brain injury (TBI) induces a neuroinflammatory response that involves innate and adaptive immune activation. We sought to investigate whether the absence of innate immune signaling via TLR4 would be protective in a murine TBI model (4-8 week-old males).

Methods: A controlled cortical impact murine TBI model using C57BL/6 wild-type (WT) and TLR4 knockout (KO) mice was performed by shooting a piston on the left parietal lobe. MRI was utilized to assess brain injury volume. Using confocal immunofluorescence (IF) stained for CD3, TUNEL and NeuN, sections of injured brains were labeled to quantify and determine the pattern of parietal cortex CD3+ cell infiltration and neuronal apoptosis. All analyses were performed at 24hrs and 7 days after trauma. Student's T-test was used for statistical analysis with significance achieved when $p<0.05$.

Results: Strikingly, the volume of brain injury in TLR4-KO mice was significantly greater ($19\pm2mm^3$, n=3) when compared to C57BL/6 WT mice ($11\pm1mm^3$, n=4) 24hrs post-TBI (p=0.01). However, TLR4-KO mice ($4\pm1mm^3$, n=5) showed a smaller lesion than C57BL/6 WT mice ($8\pm1mm^3$, n=5) 7 days post-TBI (p=0.003). Confocal IF demonstrated widespread cortical areas of neuronal apoptosis and CD3+ cell infiltration at both time points. CD3+ cell infiltration was significantly lower in TLR4-KO mice (8±4cells/hpf) than C57BL/6 WT mice (36±10cells/hpf) (p=0.0013) 24hrs post-trauma. Interestingly, neuronal apoptosis was significantly greater in TLR4-KO (307±134cells/hpf) compared to C57BL/6 WT (108±30cells/hpf) only after 7 days (p=0.01).

Conclusion: Our findings indicate that TLR4 plays a protective role within the first 24hrs post-TBI. A possible mechanism would be the significantly increased T-cell infiltration in WT brains, which has been shown to exert neuroprotective effects by skewing myeloid cells to an M2 phenotype, as well as secreting neuroprotective molecules such as BDNF. Targeting the innate immune system within 24hrs of TBI may prove to be a promising therapeutic option.

Scientific Session III (cont.)

40

DEVELOPMENT AND VALIDATION OF A NEW PEDIATRIC RESUSCITATION AND TRAUMA OUTCOME (PRESTO) SCORE USING THE U.S. NATIONAL TRAUMA DATA BANK

Etienne St-Louis, MDCM, MSc, PhD(c)[1], Robert J. Baird, MDCM, MSc[1], Tarek Razek, MDCM[1], James A. Hanley, PhD[2].

[1]McGill University Health Centre, Montreal, QC, Canada, [2]McGill University, Montreal, QC, Canada.

Background: There is a need for a pediatric trauma outcomes benchmarking model that is adapted for Low- and Middle-Income Countries (LMICs). Limited data from LMICs precludes development and validation in situ. We used data derived from the National Trauma Data Bank (NDTB) and applied constraints specific to resource-poor environments to develop and validate an LMIC-specific pediatric trauma score.

Methods: We collected demographic, physiologic, anatomic and outcome data on a sample of pediatric trauma patients aged 0-14 years from 2007-2012. The primary outcome was in-hospital death. Logistic regression was performed to identify independent predictors of in-hospital death. From these, the Pediatric Resuscitation and Trauma Outcome (PRESTO) score was created to include only low-tech variables - those easily obtainable at point-of-care. Internal validation was performed using 10-fold cross-validation. External validation compared PRESTO to TRISS and to a full-model including all NTDB variables using ROC analyses.

Results: We included 651,030 patients. There were 64% males and median age was 7. In-hospital mortality rate was 1.2%. Mean TRISS "b" coefficient and predicted mortality were 14.26 and 0.04% (range 0-43%), respectively. Variables found to independently predict mortality included in PRESTO ($p<0.01$) were age, blood pressure, neurologic status, need for supplemental oxygen, pulse, oxygen saturation and an interaction term for age and pulse. The sensitivity and specificity of PRESTO were 95.7% and 94.0%, respectively. The resulting model had an AUC of 0.98 compared to the AUC of 0.89 for TRISS and 0.99 for the full model.

Conclusion: The PRESTO score satisfies the requirements of a low-resource setting and is inherently adapted to children, allowing for benchmarking and eventual quality improvement initiatives. Further research is necessary for in situ validation using prospectively collected LMIC data.

Scientific Session IV

Scientific Session IV: CDH/ECMO, Neonatal Surgery, Thoracic
Friday, May 5, 12:15 – 1:30 p.m.

41

DEVELOPMENT AND VALIDATION OF PRE- AND ON-ECMO MORTALITY-RISK MODELS FOR CONGENITAL DIAPHRAGMATIC HERNIA

Yigit S. Guner, MD[1], Danh Nguyen, PhD[2], Lishi Zhang, MS[2], Yanjun Chen, MS[2], Matthew T. Marting, MD[3], Matteo Di Nardo, MD[4], John Cleary, MD[5], Peter T. Yu, MD[1].

[1]Children's Hospital of Orange County/University of California Irvine, Orange, CA, USA, [2]University of California Irvine, Orange, CA, USA, [3]University of Texas McGovern Medical School and Children's Memorial Hermann Hospital, Houston, TX, USA, [4]Ospedale Pediatrico Bambino Gesu, Rome, Italy, [5]Children's Hospital of Orange County, Orange, CA, USA.

Tweet about it: CDHECMOSCORE

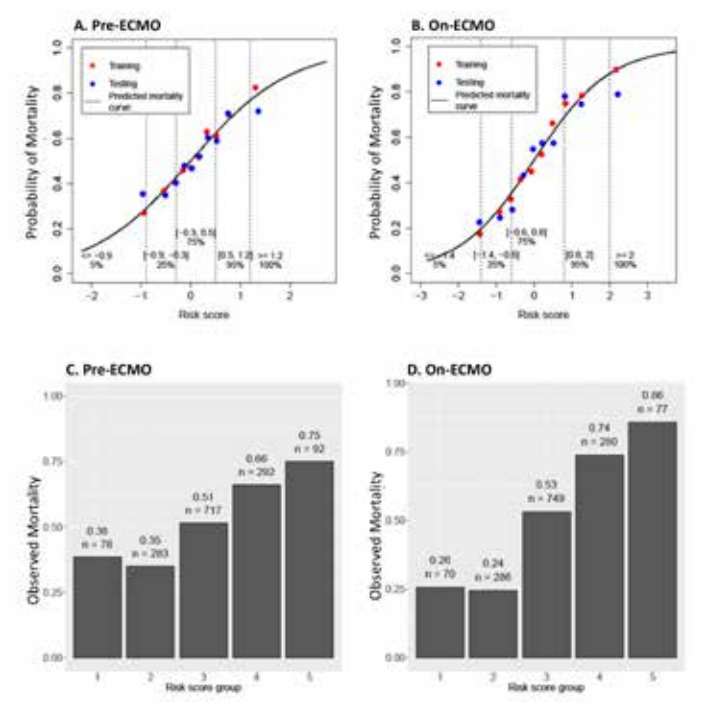
Purpose: There are no validated tools to predict mortality risk of a neonate with CDH prior to initiation of ECMO or during the course of ECMO. The objective of this study was to develop mortality risk models for CDH pre- and on-ECMO.

Methods: ELSO (Extracorporeal Life Support Organization) registry (2000-2015) data were used to develop pre- and on-ECMO mortality prediction scores for CDH. Prediction models were developed using multivariable logistic regression analyses. The cohort was randomly divided into a two-thirds (n=2,912) set for development and a one-third (n=1,462) set for validation. Predictive discrimination was assessed using the C-statistic. Observed mortalities for pre- and on-ECMO were further examined by five risk groups defined by percentiles of the risk-score (lowest 5%, 5-25%, 25-75%, 75-95% and highest 5%).

Results: We identified 4,374 neonates with CDH with an overall mortality of 52%. The pre-ECMO risk score included pre-ECMO ventilator settings, pH, DH repair prior to ECMO, critical congenital heart disease, perinatal infection and demographics. Predictive discrimination (C-statistic) for pre-ECMO mortality model was C = 0.65 (95% CI: 0.62-0.68) on the validation data. For the on-ECMO model, mortality prediction improved substantially: C = 0.73 (95% CI: 0.71-0.76) with the addition of on-ECMO associated complications and comorbidities. Panels A and B demonstrate predicted probability of mortality as a function of risk score for the pre- and on-ECMO models, respectively. Panels C and D depict observed rate of mortality according to the five risk score groups for the pre- and on-ECMO models, respectively. Online mortality risk calculators for both pre- and on-ECMO models are accessible at *http://www1.icts.uci.edu/berd/cdhecmoscore.html*

Conclusions: Mortality among CDH neonates prior to and on-ECMO can be reliably predicted with specific validated clinical variables identified in this study. Prediction of outcome-based risk may optimize early management, family counseling and resource utilization among CDH patients requiring ECMO.

Scientific Session IV (cont.)



Scientific Session IV (cont.)

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AMNIOTIC FLUID STEM CELL DERIVED EXOSOMES: A NOVEL THERAPEUTIC STRATEGY FOR LUNG HYPOPLASIA IN CONGENITAL DIAPHRAGMATIC HERNIA

Vincenzo D. Catania, MD, Jennifer Guadagno, PhD, Bibek Saha, BSc, Qi Ma, BSc, Alyssa Belfiore, BSc, Yuhki Koike, MD, PhD, Bo Li, PhD, Augusto Zani, MD, PhD.
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Purpose: Amniotic fluid stem cells (AFSC) improve lung branching morphogenesis in a nitrofen induced model of congenital diaphragmatic hernia (CDH). However, the mechanism employed by AFSC to exert their beneficial effect on lung epithelium is still unknown. We aimed to investigate whether AFSC-derived exosomes could rescue lung growth in an *ex vivo* model of CDH.

Methods: Exosomes were isolated from ultra-centrifuged AFSC conditioned medium (AFSC-CM), and quantified using both nanoparticle tracking analysis (Malvern NanoSight) and protein quantification using BCA Assay. At E14.5, lungs were harvested from CDH fetuses of Sprague-Dawley dams that were administrated nitrofen (100mg) on E9.5 (animal protocol n.39168). Lung explants were cultured on filtered membranes and incubated with i) culture medium alone (DMEM), ii) AFSC-CM (500 µl) or iii) AFSC-exosomes (400 µg/ml); iv) fetal lungs from untreated dams served as control. Lung explants were compared for terminal bud density and surface area at 72h. Data were analyzed with one-way ANOVA with Tukey post-test. To investigate exosome migration ability, AFSC-exosomes were labeled with fluorescent dyes (red=RNA, green=protein) using Exo-Glow™ and visualized by two-photon excitation microscopy.

Results: At 72h, explant lungs in DMEM had decreased terminal bud density and surface area compared with control (**Figure 1**). Lungs treated with either AFSC-CM or AFSC- exosomes had increased terminal bud density and surface area compared with lungs in DMEM. However, only AFSC-exosomes restored lung growth parameters to control values. Moreover, AFSC-exosomes were able to migrate inside the lung explant as shown by presence of both RNA and protein material at microscopy (**Figure 2**).

Conclusions: This study demonstrates for the first time that AFSC-exosomes recover lung growth in experimental CDH. Further studies are needed to investigate the protein/genetic content of AFSC-exosome cargo that is involved in the intercellular information trafficking. Stem cell based therapy may provide novel opportunities in the treatment of lung hypoplasia for CDH fetuses.

Scientific Session IV (cont.)

Fig. 1

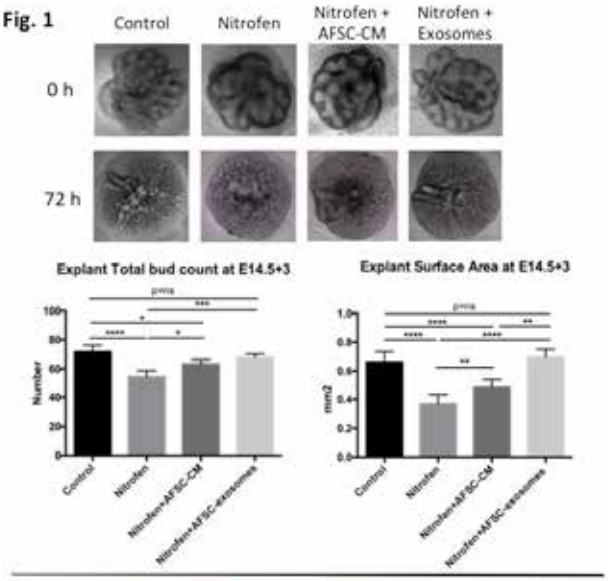
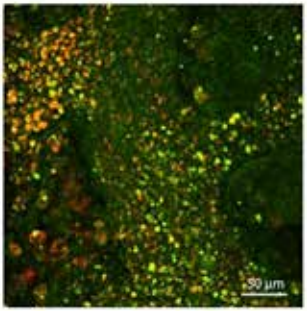


Fig. 2



Scientific Session IV (cont.)

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OUTCOMES OF CONTINUOUS ELECTROENCEPHALOGRAPHIC MONITORING ON PEDIATRIC EXTRACORPOREAL MEMBRANE OXYGENATION PATIENTS

Shunpei Okochi, MD, Jennifer M. Bain, MD, PhD, Cherease Street, BS, Aqsa Shakoor, MD, Svetlana Streltsova, RN, MSN, CCRN, Gudrun Aspelund, MD, Eva W. Cheung, MD, William Middlesworth, MD.

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Background: Seizures occur in 10-20% of pediatric and neonatal Extracorporeal Membrane Oxygenation (ECMO) patients. Standards for neuromonitoring during ECMO support do not currently exist, and there is wide variability in practice. We present the institutional experience at an academic children's hospital since establishment of a continuous electroencephalography (cEEG) monitoring protocol for ECMO patients.

Purpose: To report findings of cEEG monitoring of pediatric and neonatal ECMO patients.

Methods: Single-center retrospective review of patients age 18 years and under, cannulated for ECMO between 9/2014 and 11/2015. Categorical variables were analyzed with chi-square or Fisher's exact test and continuous variables with two-tailed heteroscedastic t-test. This study had the approval of Columbia University Institutional Review Board.

Results: During the study period, 63 patients were cannulated for ECMO, of whom 45 had cEEG monitoring. Median time from cannulation to cEEG monitoring was 10.1h, and the median duration of cEEG was 101.8h. Electroencephalographic seizures were observed in 10/45 (22%) of patients, including 4/45 (9%) with status epilepticus. 4/10 (40%) of those patients had subclinical NCS. Among patients with seizures, 4/10 (40%) occurred in the initial 24 hours of ECMO support, 2/10 (20%) at 24-48h, 1/10 (10%) at 48-72h, none between 72-96h, and 3/10 (30%) thereafter. There was radiographic evidence of stroke in 9/10 (90%) patients with seizures. Among patients observed to have seizure-like activity, only 6/11 (55%) had encephalographic confirmation. Survival to hospital discharge was significantly greater for ECMO patients without seizures (78% vs. 30%, p=0.02)

Conclusions: Seizures occur in a significant proportion of pediatric and neonatal ECMO patients, frequently in the initial 48h of ECMO support. Prior studies have demonstrated lower seizures rates with intermittent EEG use in this population. Because seizures are associated with decreased survival, we demonstrate that continuous neuromonitoring early in the ECMO course is important. Further studies are needed to correlate EEG findings with neurologic outcome.

Scientific Session IV (cont.)

44

VALIDATION OF AN EXTRACORPOREAL MEMBRANE OXYGENATION (ECMO) RISK PREDICTION MODEL IN NEWBORNS WITH CONGENITAL DIAPHRAGMATIC HERNIA (CDH)

Tim Jancelewicz, MD, MA[1], Elizabeth A. Tolley, PhD[2], Mary E. Brindle, MD, MPH[3], Matthew T. Harting, MD, MS[4], Max R. Langham Jr., MD[1], Pamela A. Lally, MD[4], David W. Kays, MD[5].

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Tweet about it: ECMO risk prediction in newborns with CDH: a CDHSG registry study

Purpose: Early postnatal prediction of subsequent need for ECMO in CDH newborns could facilitate expedited patient transfer to an ECMO center and could aid decision-making regarding operative timing. Mortality risk may be estimated using a number of methods, but no equivalent tool exists for prediction of ECMO support. The purpose of this study was to validate a previously derived ECMO risk stratification model using a large cohort of CDH patients.

Methods: The CDH Study Group registry was queried for the period 2001-2016. An institutional ECMO prediction model was modified to match variables present in the registry, and the cohort was restricted to correspond as closely as possible to the model source population. The cohort was split randomly into equal sets, and the model was first developed on the derivation set using stepwise multivariable logistic regression ($P<0.05$ for qualifying variables). The model was validated using the second set. Subgroups were tested to assess discrimination of the model on different CDH populations.

Results: There were 6355 patients before restriction to inborn, ECMO-eligible, left-sided CDH patients, yielding 768 patients in the model derivation set and 752 in the validation set after random splitting. There were two significant variables in the final ECMO risk model: 1-minute Apgar score and highest post-ductal PaCO2 during the first 24 hours of life. The model c-statistic was 0.82 for the derivation set, and 0.77 for the validation set using the same coefficients (**Figure 1**). The Hosmer-Lemeshow goodness of fit test P value was 0.44. Subgroup analysis showed that the model had good discrimination of ECMO risk irrespective of center volume or CDH laterality.

Conclusions: This study represents proof-of-concept that risk for ECMO can be estimated in newborns with CDH using a simple predictive model, and prospective validation is warranted. Inclusion of prenatal and earlier postnatal data could allow more efficient risk assessment.

Scientific Session IV (cont.)

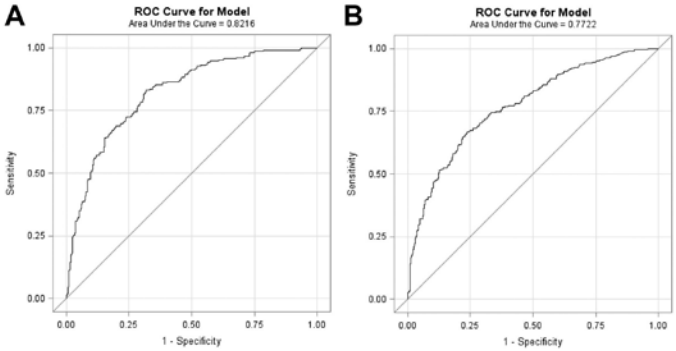

Figure 1 – Receiver-operator characteristic (ROC) curves for the ECMO risk prediction model using the derivation set (A) and validation set (B). The model, derived using a stepwise selection algorithm, was logit(probability of ECMO)=(-2.313)+(-0.248*Apgar1)+(0.041*CO2High).

Scientific Session IV (cont.)

45

THORACOSCOPIC MANAGEMENT OF NON TYPE C ESOPHAGEAL ATRESIA AND TRACHEOESOPHAGEAL FISTULA

Steven S. Rothenberg, MD.

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Purpose: Thoracoscopic management of Type C esophageal atresia is a well-acknowledged and proven technique. However, thoracoscopic management of non Type C has not been well studied. This study evaluates the results of thoracoscopic management of complex, non Type C, esophageal atresias (EA) and trachea-esophageal fistulas (TEF) in infants at a single institution.

Methods: From March 2000 to September 2016, 20 patients were treated for Type A N=12 (pure EA), Type B N=3 (EA w proximal fistula) and Type E (H-type fistula) N=5. Patients diagnosed with EA had G-tube feeds for a period of 4-9 weeks. 3 patients were found to be Type B at bronchoscopy prior to the repair. All procedures were performed thoracoscopically using a 3 port technique. EA gaps were between 4- 7 1/2 vertebral bodies. Fistulas were divided and sutured in 3 cases, endoclipped in one and divided with a 5mm endoscopic stapler in 4.

Results: All surgeries were completed thoracoscopically. Average operative time was 95 minutes Type A, 115 type B, and 50 for Type D. Two patients with long gaps had small leaks which resolved with conservative management. One patient with an H-type was re-intubated causing a partial disruption of the tracheal repair. This required thoracoscopic re-exploration with repair with placement of an intercostal muscle flap. Six of the EA patients required esophageal dilations (1-6). No patient has any clinical evidence of fused ribs, chest wall asymmetry, shoulder girdle weakness or winged scapula.

Conclusion: Thoracoscopic repair of complex and long gap EA and TEF is safe and effective. The excellent visualization of the thoracic inlet allows for extensive mobilization, key to creating length for long gaps and safely managing high fistulas. This may limit injury to adjacent structures as well as avoid a neck incision and chest wall deformity.

Scientific Session IV (cont.)

46

LAPAROSCOPIC SURGERY IN NEONATES UNDER SPINAL ANESTHESIA: OUR INITIAL EXPERIENCE

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Purpose: The goal of this study was to review our initial experience with simple laparoscopic procedures performed under spinal anesthesia in neonates.

Methods: IRB approval was obtained. We reviewed charts of all patients under 6 months of age who underwent certain laparoscopic procedures under either general or spinal anesthesia at our institution from 1/1/2012- 3/15/2016. Specifically, inguinal hernia repair, gastrostomy tube placement, and a pedunculated hepatic cyst excision were included. The principal outcome was need for intubation postoperatively or reintubation. Secondary outcomes included unintended admission to NICU, episodes of apnea or bradycardia, operative time and need for postoperative pain medications.

Results: A total of 35 procedures met inclusion criteria. The sample was 77.1% male, the median age was 2.4 months (IQR 1.8 to 3.1 months). 24 had general anesthesia (21 inguinal hernia repairs, 3 gastrostomy tube placements) and 11 had spinal anesthesia (6 inguinal hernia repairs, 4 gastrostomy tube placements and 1 pedunculated hepatic cyst excision). Characteristics, by anesthesia type, are shown in Table 1. Weight and total time in OR are expressed as median value with interquartile range. Compared to general anesthesia, patients undergoing spinal anesthesia were older, weighed significantly less and were much more likely to have a respiratory comorbidity. While total operative times were comparable between spinal and general groups (41min vs. 39min), patients undergoing general anesthesia spent significantly more total time in the OR (108 min vs. 98 min).

Patient Characteristics by Anesthesia Type

	Overall (n=35)	Spinal (n=11)	General (n=24)	Effect size	P value
% Premature	16 (45.7%)	6 (54.6%)	10 (41.7%)	0.21	0.72
Weight (kg)	4.3 (3.0-5.3)	3.4 (2.5-3.8)	4.8 (3.9-6.1)	1.00	0.01
Any Comorbidity	17 (48.6%)	8 (72.7%)	9 (37.5%)	0.70	0.08
Respiratory Comorbidity	11 (31.4%)	8 (72.7%)	3 (12.5%)	1.00	0.001
Total time in OR (min)	102 (93-113)	98 (85-102)	108 (95-133)	0.89	0.03
Intraoperative change in vital signs	5 (14.3%)	1 (9.1%)	4 (16.7%)	0.24	1.00
Postoperative Intubation	1 (2.9%)	0	1 (4.2%)	0.30	0.49
Postoperative Bradycardia	1 (2.9%)	0	1 (4.2%)	0.30	0.49
Postoperative Opiates	11 (34.4%)	3 (27.3%)	8 (33.3%)	0.11	0.72

Scientific Session IV (cont.)

Conclusions: We conclude that spinal anesthesia offers a viable option for simple laparoscopic procedures performed in the neonatal period, especially for neonates born prematurely.

Scientific Session IV (cont.)

47

SURGICAL OUTCOMES FOR CONGENITAL LUNG MALFORMATIONS: COMPARISON OF EXIT-TO-RESECTION VS. URGENT OR ELECTIVE POSTNATAL OPERATIONS

Candace C. Style, MD, Stephanie M. Cruz, MD, Oluyinka O. Olutoye, MD, PhD, Patrico E. Lau, MD, Irving J. Zamora, MD, Timothy C. Lee, MD, Rodrigo Ruano, MD, PhD, Stephen E. Welty, MD, Sundeep G. Keswani, MD, Darrell L. Cass, MD.

Texas Children's Hospital, Baylor College of Medicine, Houston, TX, USA.

Purpose: To examine post-surgical outcomes for fetuses with congenital lung malformations (CLM) treated with fetal surgery, or urgent or elective postnatal operations.

Methods: A retrospective review was performed of a prospectively collected dataset of all fetuses evaluated for a CLM between July 2002 and September 2016. Prenatal findings, operative treatment and postnatal outcomes were collected.

Results: Of 210 fetuses identified, 137 had operations and follow-up at our center (3-fetal demise; 8-follow-up at another institution; 62-followed non- or pre-operatively). Of 137, 6 had fetal lobectomy (n=5) or pneumonectomy (n=1) at 21-25 weeks' gestation, 16 had EXIT-to-resection (37 weeks' mean gestation), 13 had urgent thoracotomy <30 days of life (DOL), and 102 with asymptomatic lesions had elective resection at >30 DOL. Comparing pathologic findings, infants requiring fetal surgery or EXIT-to-resection had a higher incidence of CCAM diagnosis (83.3% and 64.5%, respectively, $p<0.01$), while no patient with a diagnosis of segmental bronchial atresia required fetal intervention. Prenatal findings of polyhydramnios, hydrops, and CVR >1.6 correlated with increased need for fetal or urgent surgical intervention ($p<0.01$; table). Infants treated with EXIT-to- resection had shorter duration of intubation ($p <0.001$) and hospital stay compared to those treated with urgent neonatal resection ($p<0.05$). Infants treated with elective resection had 100% survival with 3 days median hospital stay.

Conclusion: Fetuses with a postnatal diagnosis of congenital lobar emphysema, segmental bronchial atresia and bronchogenic cyst are unlikely to require fetal intervention. Fetuses treated with EXIT-to-Resection have improved survival and shorter hospital stay compared to those treated with urgent neonatal resection. Infants with asymptomatic CLM have quick recovery and excellent outcomes following elective resection.

Scientific Session IV (cont.)

Table 1

	Fetal Mass Resection (n=6)	EXIT (n=16)	Urgent Resection (<30 DOL) (n=13)	Elective (n=102)	p-value
CVR >1.6	100% (n=6)	100% (n=6)	85% (n=11)	14% (n=14)	<0.01
Hydrops	100% (n=6)	44% (n=7)	15.4% (n=2)	0%	<0.01
Length of Stay, Days	41 [3-76]	26.7 [7-68]	46.8 [2-180]	3 [1-11]	<0.05
Survival to Discharge	67% (n=4)	100% (n=16)	77% (n=10)	100%	<0.01
Length of Intubation, days	14 [0-40]	5.7 [4-19]	11.6 [2-31]	0.5 [0-1]	<0.01
Oxygen Requirement at 6 months	25% (n=1)	6% (n=1)	18% (n=2)	0%	<0.01

Scientific Session IV (cont.)

48

POST-OPERATIVE METRICS AND RISK FOR PLEUROPULMONARY BLASTOMA FAVOR RESECTION OF CONGENITAL PULMONARY AIRWAY MALFORMATIONS PRIOR TO THE ONSET OF SYMPTOMS

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[1]Department of Surgery, Section of Pediatric Surgery; Indiana University School of Medicine, Indianapolis, IN, USA, [2]Indiana University School of Medicine, Indianapolis, IN, USA.

Tweet about it: CPAMs: Risk of PPB and immediate post-op metrics favor resection prior to onset of symptoms, consider early resection

Purpose: The purpose of this study is to describe a single institution's 11-year experience treating children with congenital pulmonary airway malformations (CPAM) and pleuropulmonary blastoma (PPB). Goals include describing outcomes of patients with asymptomatic CPAM versus symptomatic CPAM who undergo resection and identifying patients with PPB within the study period.

Methods: An institutional database was sampled for all patients aged 0-18 years old from 1/1/2005 to 12/31/2015. Patients with a pathologic diagnosis of CPAM or PPB were identified and their charts were reviewed.

Results: A total of fifty-two patients with a pathologic diagnosis of CPAM (n=46; 88.5%), or PPB (n=6; 11.5%) underwent surgical resection. Among patients treated for PPB, one death occurred approximately thirteen months after diagnosis. The remaining patients with PPB (n=5) have a seventy-four month median overall survival. Recurrent disease has been treated in two of the survivors. Although four patients with PPB had radiographic indicators highly suggestive of malignancy, two had a pre-operative diagnosis of CPAM. Twenty-five patients (25/46; 54.3%) with CPAM underwent resection after developing symptoms attributable to their lesion and twenty-one (21/46; 45.7%) were asymptomatic at the time of surgery. There was a statistically significant difference in post-operative length of stay (median/mean: 5/11.4 days vs. 3/2.8 days; $p < 0.001$) and days with thoracostomy tube in place (median/mean: 3/4.7 days vs. 2/2.7 days; $p = 0.003$) for symptomatic versus asymptomatic patients, respectively.

Conclusions: Given the difficulty distinguishing CPAM from PPB prior to surgery and post-operative metrics favoring intervention in asymptomatic patients, a low threshold for resection should be maintained.

Scientific Session IV (cont.)

49

CLOACA REPAIR: A NEW ALGORITHM WHICH CONSIDERS THE ROLE OF URETHRAL LENGTH IN DETERMINING SURGICAL PLANNING

Richard J. Wood, MD, Marc A. Levitt, MD.
Nationwide Children's Hospital, Columbus, OH, USA.

Introduction: Cloacal malformations represent complex challenges to surgeons with the approach to date based on common channel length. We believe this is an over-simplification, and that urethral length is also key in surgical planning.

Methods: We reviewed 50 consecutive cloaca patients referred to our team from April 2014 to July 2016. There were 19 post-operative patients from other institutions and 31 cloacas who we primarily repaired. The common channel length, urethral length, and reconstruction techniques were recorded.

Results: Of 19 patients referred after surgery done elsewhere, 3 had a urethra less than 1 cm post-operatively and these all had constant urinary leakage. 5 with an original 3 to 5 cm common channel who had undergone total urogenital mobilization (TUM) experienced urethral loss needing vesicostomy, and later, a Mitrofanoff. Of 31 primary cases, the common channel length was 1-3 cm in 20, 3-5 cm in 9, and >5 cm in 2. In the 1-3 cm and 3 -5 cm groups, a urethra less than 1.5 cm led us to perform a uro-genital separation. Only in patients with a urethra > 1.5 cm did we perform a TUM. Using this protocol, we performed a urogenital separation in 1 of 20 in the 1-3 cm, 6 of 9 in the 3-5 cm, and 2 of 2 in the 5 cm groups. There was one postoperative urethra-vaginal fistula leading us to protect the urethral repair with a fat pad, biologic patch, and circle stent, preventing any further in the series. No urinary leakage occurred in any patient. Thus far no patients need intermittent catheterization to empty the bladder.

Conclusion: Urethral length is a vitally important factor in the planning for a cloacal reconstruction. Long-term bladder and bladder neck function will need to be carefully documented to understand the impact of this reconstructive strategy.

Innovation Session

Saturday, May 6, 8:00 – 9:00 a.m.

i1

PREDICTING THE NEED FOR ECMO IN NEONATES WITH CONGENITALDIAPHRAGMATIC HERNIA WITH A NOVEL MULTIMODAL COMPUTATIONAL SYSTEM USING NEAR-INFRARED SPECTROSCOPY

Stephanie M. Cruz, MD, Patricio E. Lau, MD, Darrell L. Cass, MD, Candace C. Style, MD, Craig G. Rusin, PhD, Timothy C. Lee, MD, Christopher J. Rhee, MD, Sundeep G. Keswani, MD, Rodrigo Ruano, MD, PhD, Stephen E. Welty, MD, Oluyinka O. Olutoye, MD, PhD.
Baylor College of Medicine/Texas Children's Hospital, Houston, TX, USA.

Background/Purpose: We had previously shown that interhemispheric differences in cerebral tissue oxygen saturation ($cStO_2$) via Near Infrared Spectroscopy (NIRS) within the first 12 hours of life (HOL) was a strong predictor of the need for Extracorporeal Membrane Oxygenation (ECMO) in neonates with congenital diaphragmatic hernia (CDH). The purpose of this study was to develop a computational algorithm that would be a diagnostic tool predicting requirement of ECMO initiation in CDH.

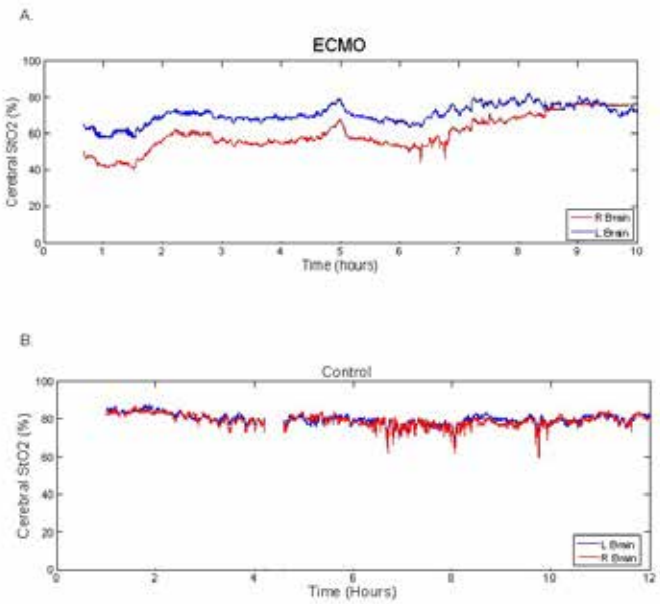
Methods: Patients with CDH from August 2010-August 2016 were enrolled in a study to continuously measure cerebral tissue oxygen saturation (cStO2) of left and right cerebral hemispheres. NIRS devices utilized were FORE-SIGHT, CASMED and INVOS 5100, Somanetics. Using MATLAB©, a data randomization function was used to de-identify and blindly group patient's data files as follows: 12 for the computational model development phase (6 ECMO and 6 no-ECMO) and the remaining patients for the validation phase.

Results: Of the 56 CDH patients enrolled, four patients were excluded from analysis due to lack of continuous data. Excluding the 12 patients in the model phase, 33 were used for the validation phase (9 ECMO and 24 no-ECMO). During development of the model, a difference between right and left hemispheric cerebral perfusion via NIRS (ΔHCP) was noted in CDH patients that required ECMO (see Figure). Using ROC analysis, a ΔHCP cutoff >10% was predictive of ECMO initiation (Area under curve: 0.92, 85% sensitivity, 100% specificity, $p<0.001$). In the validation phase, the algorithm correctly identified ECMO initiation within the first 12 HOL and at least 6 hours prior to the clinical decision with 88% sensitivity and 97% specificity.

Conclusion: We have developed a computational algorithm that predicts the need for ECMO in neonates with CDH. This tool has the potential of being translated into a real-time clinical interface that may improve management of patients with CDH.

Innovation Session (cont.)

Figure. Right and Left Cerebral tissue oxygen saturation (StO_2) in CDH patients who (A) required ECMO and (B) did not require ECMO



Innovation Session (cont.)

i2

THREE-DIMENSIONALLY PRINTED SURFACE FEATURES TO ANCHOR ENDOLUMINAL SPRING FOR DISTRACTION ENTEROGENESIS

Nhan T. Huynh, MD[1], Genia Dubrovsky, MD[1], Joshua D. Rouch, MD[1], Andrew Scott, MD[1], Elvin Chiang, MD[1], Tommy Nguyen[2], Benjamin M. Wu, DDS, PhD[2], Shant Shekherdimian, MPH, MD[1], James C.Y. Dunn, MD, PhD[3].

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Purpose: Spring-mediated distraction enterogenesis has been studied as a novel treatment for short bowel syndrome. Previous approaches are limited by multiple surgeries that are needed to restore intestinal continuity or to place extraluminal devices. Purely endoluminal devices require a period of intestinal attachment for enterogenesis. The purpose of this study is to modify the surface of springs to allow for sequential endoluminal placement in a porcine model.

Methods: Roux-en-Y jejunostomy with a defunctionalized stoma was created in juvenile mini-Yucatan pigs. Three-dimensionally printed, biocompatible springs with unidirectional or bidirectional surface features were endoluminally placed via the stoma. Springs with smooth surfaces were used as controls (Figure). Spring location was evaluated weekly by abdominal radiographs. Bowel was examined directly for the presence of spring at 4 weeks.

Results: Control springs with smooth surfaces passed through the intestine in less than 1 week after placement. Endoluminal springs with unidirectional surface features stayed attached for up to 3 weeks before passing through the intestine. Springs with bidirectional surface features were anchored to the intestine for the entire 4 weeks. Intestinal diameter at the site of spring placement was increased compared to normal jejunum (15.7 ± 0.6 mm versus 7.3 ± 0.4 mm). Histologically, jejunal architecture was preserved with significantly increased crypt depth and muscularis thickness in comparison to normal jejunum. Animals tolerated the procedure well. Repeated endoluminal spring placement via stoma was feasible.

Conclusion: Bidirectional features printed on springs prevented premature detachment. Such novel spring anchors allow for endoluminal placement without any sutures. This approach may lead to the clinical application of the device for patients with short bowel syndrome.

Innovation Session (cont.)

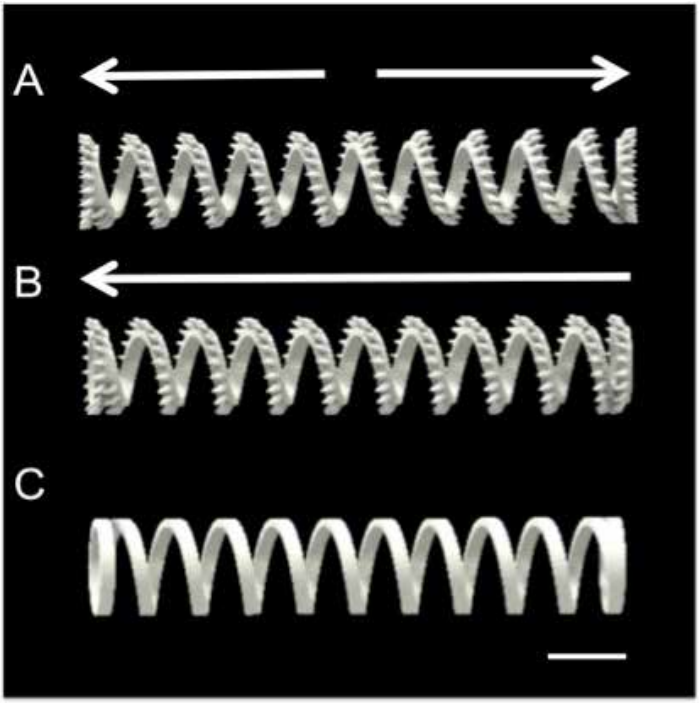

Figure. Designs of three-dimensionally printed springs with A) bidirectional features, B) unidirectional features, or C) smooth surface. Direction of features is indicated by the arrows. Scale bar is 1 cm.

Innovation Session (cont.)

i3

DEVELOPMENT OF AN ENGINEERED INTESTINE USING A NOVEL BIOENGINEERED SCAFFOLD IN A PIGLET MODEL WITH DEMONSTRATION OF CRYPT GROWTH, DIFFERENTIATION, AND VASCULOGENESIS

Laura Y. Martin, MD[1], Mitchell R. Ladd, MD[1], John C. March, PhD[2], Cait Costello, PhD[2], Hongpeng Jia, MD[1], Sodhi P. Chhinder, PhD[1], Adam Werts, DVM[1], Peng Lu, PhD[1], Diego F. Nino, MD[1], Emilyn Banfield, BS[1], Quinjie Zhou, PhD[1], William Fulton, MS[1], Jungeun Sung, BS[1], Thomas Prindle, BS[1], David J. Hackam, MD, PhD[1].

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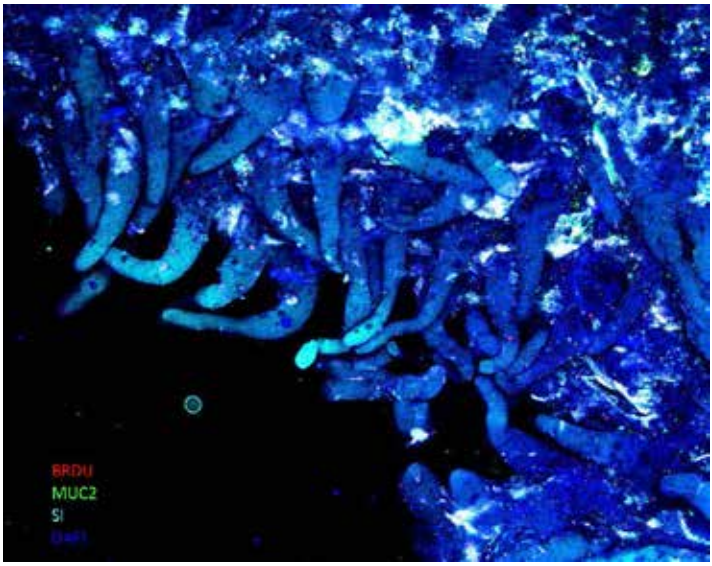
Purpose: Short bowel syndrome is a devastating disease, for which there are limited treatment options. We have developed a novel bioengineered scaffold with a 3-dimensional architecture that mimics the native intestine and supports growth of auto-transplanted intestinal stem cells (ISCs). We now seek to test the functionality of the implanted prototype in a porcine model and evaluate the capability for mucosal restoration, namely epithelial crypt turnover and vasculogenesis.

Methods: 3D polyethylene-vinyl-acetate scaffolds resembling human intestine were prepared using a serial fabrication technique. 3-day-old piglets (n=8, 1500±50g) underwent laparotomy and small bowel resection (10cm.) Intestinal stem cells were isolated from resected bowel, seeded onto the scaffold for 8 days, then scaffold-stem cell grafts were auto-transplantated into the omentum. Vasculogenesis and mucosal proliferation was confirmed by laser angiography and confocal microscopy. At 6 weeks, an engineered graft was placed into continuity with native intestine.

Results: Intestinal stem cells showed excellent proliferation and differentiation into all lineages (goblet, enterocyte, enteroendocrine, paneth) on the scaffold. Scaffold vasculogenesis was confirmed at 15 days and improved at 4 and 6 weeks as evidenced by laser angiography and confocal staining for CD31/PECAM. Placement of engineered intestine into continuity with native intestine was well-tolerated. By post-operative day 3, the piglet was off pain medication, ambulating, tolerating a regular diet, and gaining weight. On post-operative day 5, the piglet underwent repeat laparotomy. Gross evaluation revealed intact proximal and distal anastomoses with no evidence of leak. Strikingly, IHC staining of the implanted scaffold in continuity with native bowel revealed intact proliferation (BRDU uptake) and differentiation, as well as vasculogenesis, demonstrating physiological complementation of the resected intestine.

Conclusions: We have developed an engineered intestine that supports mucosal growth, differentiation and vasculogenesis in a piglet model of short bowel syndrome, raising the possibility for novel approaches to the treatment of this devastating disease.

Innovation Session (cont.)



Innovation Session (cont.)

i4

MAGNETIC APNEA PREVENTION DEVICE FOR OBSTRUCTIVE SLEEP APNEA

Claire E. Graves, MD, Philip B. Fullante, MD, Catherine Co, MD, Dillon Kwiat, BS, Jill Imamura-Ching, RN, Andrew Murr, MD, Jolie Chang, MD, Michael R. Harrison, MD.
University of California, San Francisco, San Francisco, CA, USA.

Tweet about it: Magnetic Apnea Prevention Device for Obstructive Sleep Apnea: @clairegravesmd describes early results of a minimally invasive treatment for OSA

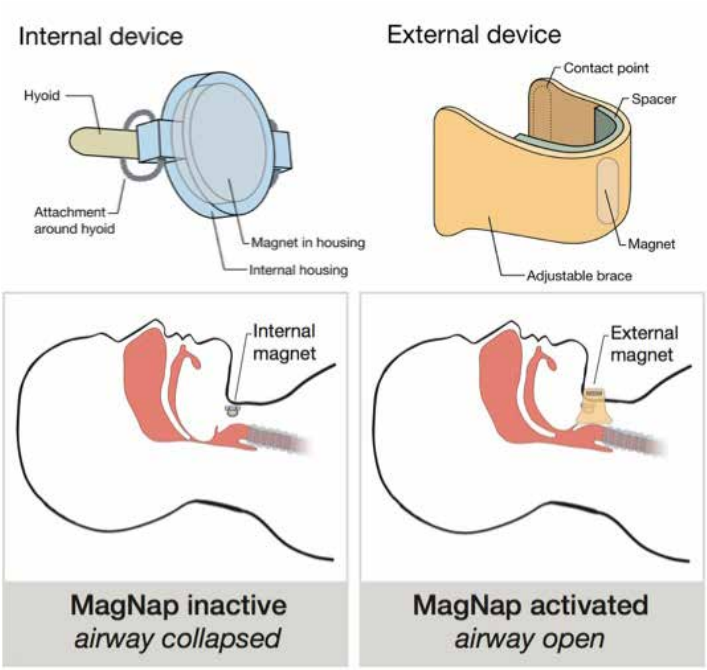
Purpose: Obstructive Sleep Apnea (OSA) affects an increasing number of pediatric patients, especially children with obesity or underlying genetic disorders. OSA causes significant cognitive and behavioral issues and is associated with medical problems including cardiovascular disease and metabolic syndrome. To prevent these long-term effects and provide a minimally invasive surgical option to treat airway collapse, we designed a magnetic apnea prevention and treatment device.

Methods: The device consists of a small magnet, implanted on the anterior hyoid, and an external magnetic neck brace, worn during sleep. The anterior force of the brace counteracts airway collapse, maintaining patency (Fig.1). Proof-of-concept testing was performed in cadavers, and we obtained FDA Investigational Device Exemption for Phase I clinical testing. Initial testing is in 10 adult patients with OSA per FDA regulation. A phase II trial is planned in pediatric patients. Our first patient is a 46 year-old male with longstanding severe OSA [apnea-hypopnea index (AHI): 42] and intolerance to CPAP. The internal magnet was implanted via small transverse neck incision. After 4 weeks, the external brace was custom-fitted. A repeat sleep study was performed with the device.

Results: Cadaver studies demonstrated that 2-5N of anterior force on the hyoid completely opened the upper airway, and pressure/flow measurements showed increased critical airflow with hyoid pull. In our first patient, the implant procedure was uncomplicated. Intraoperative laryngoscopy confirmed intact airway, and x-ray confirmed appropriate placement. Post-treatment sleep study showed decrease in AHI to 25, a 40% improvement from baseline. The patient reports subjective improvement in daytime sleepiness and morning cognition. Additional improvement is expected with further brace calibrations, and more data will be available by spring 2017.

Conclusion: A two-part magnetic apnea prevention and treatment device shows promising early results in the treatment of OSA and may provide a minimally invasive, well-tolerated treatment for both adults and children.

Innovation Session (cont.)



Innovation Session (cont.)

i5

BEYOND THE SPACE OF REX: ADVANCING MESOPORTAL RECONSTRUCTION

Stephen P. Dunn, MD[1], Warren Maley, MD[2], Abigail E. Martin, MD[1], Jeremiah Sabado, MD[1], Deborah Rabinowitz, MD[1].

[1]AI DuPont Hospital for Children, Wilmington, DE, USA, [2]Sidney Kimmel School of Medicine, Philadelphia, PA, USA.

Introduction: Meso-portal reconstruction to the space of Rex has become an accepted approach to the surgical correction of portal vein thrombosis. This technically difficult procedure targets the space of Rex due to the complexities of portal vein collaterals in the porta hepatis after thrombosis. However improved imaging can create a roadmap allowing reconstruction to the portal vein outside the space of Rex. We describe the imaging and operative approach.

Methods: Simultaneous gas portography and venous phase mesenteric angiography was performed under general anesthesia. Image analysis allowed design of an operative reconstruction that would utilize the findings to their best advantage.

Results: A 16-year-old patient with portal vein thrombosis was evaluated by gas portography and simultaneous venous phase mesenteric angiography. This demonstrated massive collateralization of the portal vein to the area of the space of Rex. However, a direct approach to the right branch and middle portion of the portal vein was possible based on the imaging. A 10 mm venous conduit was constructed over a sterile mandril and placed between the thrombosed end of the portal vein at the head of the pancreas and the midportion of the portal vein. The surgery was complicated by postoperative thrombosis requiring percutaneous thrombolysis. The portal vein was approached posterior to the porta hepatis allowing good exposure. This was successful and the patient's meso-portal shunt remains patent over one year post reconstruction.

Conclusion: Reconstruction of the portal vein outside of the space Rex is possible in cases where there are vascular disadvantages to the space of Rex. An approach to either the central or right branch of the portal vein is possible and can be rationally planned based on definitive imaging.

Innovation Session (cont.)

i6

HYDROSTATIC INTRALUMINAL ESOPHAGEAL STRETCH: PROTOTYPE FABRICATION AND INITIAL SAFETY TESTING IN A LARGE ANIMAL MODEL

Christopher D. Graham, MD[1], Hester F. Shieh, MD[1], Mustafa Karabas, MS[2], David Zurakowski, PhD[1], Anne Hansen, MD, MPH[1], Dario O. Fauza, MD, PhD[1].

[1]Boston Children's Hospital, Boston, MA, USA, [2]Wyss Institute for Biologically Inspired Engineering at Harvard University, Boston, MA, USA.

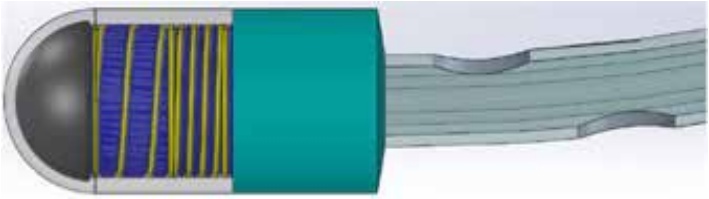
Purpose: Extraluminal traction of the esophagus for treatment of long gap esophageal atresia (Foker procedure) is invasive, requires mechanical ventilation, pharmacologic paralysis, and is associated with high morbidity. We sought to fabricate and perform large animal safety testing of a hydrostatic device for intraluminal axial distension of the esophagus, as a minimally invasive means of inducing esophageal stretch/lengthening.

Methods: The device consists of a modified infant endotracheal tube fitted with a unique balloon at its distal end, with embedded inextensible helices within its wall, so as to prevent radial, yet allow for longitudinal/axial expansion, with an integrated radiopaque dome (figure). Structural integrity and functional parameters of the prototypes were measured in an expansion test rig. Subsequently, after IACUC approval, the impact of balloon inflation pressures on esophageal perfusion was examined in lambs (n=6) with surgically created esophageal atresia. The device was placed in the proximal esophageal pouch and its intraluminal pressures were correlated with esophageal perfusion as assessed with a microvascular oximeter based on resonance Raman spectroscopy of hemoglobin. Statistical analyses included repeated measures with generalized estimating equations and inverse regression.

Results: The helicoidal architecture of the balloon led to consistent anisotropic expansion, with a stable relationship between balloon length, body width and tip radius during liquid-based expansion within the test rig. There was a significant decrease in oxygen saturation in the esophageal wall at intraluminal pressures ≥ 30mmHg (Pearson r=-0.58, Wald test=17.5, P=0.027). Regression analysis identified that an intraluminal pressure of 32mmHg correlated with oxygen saturations below 60% (P<0.001).

Conclusions: Controlled axial distension of an esophageal pouch can be achieved via an intraluminal anisotropically expandable hydrostatic device under a predictable, safe relationship between device pressure and esophageal perfusion. Intraluminal esophageal stretch may become a practical option for esophageal lengthening in the management of long gap esophageal atresia.

Innovation Session (cont.)



Innovation Session (cont.)

i7

NEONATAL ESOPHAGEAL TRACHEALIZATION AND ESOPHAGOCARINOPLASTY IN THE TREATMENT OF FLOW LIMITED FLOYD II TRACHEAL AGENESIS

Ruchi A. Amin, MD[1], Keith T. Oldham, MD[1], Kathleen M. Dominguez, MD[2], Elizabeth R. Berdan, MD[1], Michael E. McCormick, MD[1], David J. Beste, MD[1], Louella B. Amos, MD[1], Cecilia A. Lang, APNP[1], Ronald K. Woods, MD[1], Peter C. Kouretas, MD[1], Michael E. Mitchell, MD[1], John C. Densmore, MD[1].

[1]Children's Hospital of Wisconsin, Milwaukee, WI, USA, [2]Marshfield Clinic, Marshfield, WI, USA.

Tweet about it: Oldest reported TA survivor in US undergoes innovative lifesaving surgery with multidisciplinary team.

Purpose: Tracheal agenesis (TA) is an extremely rare and highly mortal condition. The feasibility of salvage in TA infants is dependent on adequate tracheoesophageal fistula (TEF) to survive prompt transfer and appropriate surgical management. We present the oldest reported TA survivor in the United States.

Methods: A term male infant with polyhydramnios underwent multiple attempts at endotracheal intubation for respiratory distress after delivery at a regional Level III NICU. After failed tracheostomy attempt, the baby was intentionally ventilated via the esophagus with correction of his hypoxia. Following phone consultation with a Level I Children's Surgery Center, an emergent laparotomy with hemoclip occlusion of the intraabdominal esophagus and Stamm gastrostomy were performed to optimize ventilation. The patient was transferred to the Level I Children's Surgery Center where CT angiogram demonstrated Floyd II tracheal agenesis and a bridging 1 mm diameter TEF connecting carina to mid esophagus. Subsequent cranial MR showed no hypoxic injury. With the expectation for normal neurodevelopmental recovery, the patient underwent cervical esophagus division with spit fistula and airway esophagostomy on DOL 18, with plan for interval external esophageal stenting in 6 months time. However, by DOL 75 with appropriate somatic growth, the fistula proved inadequate for gas exchange. Using 3D printed models, external stenting with circumferential 20mm ringed PTFE over 5 cm was planned. An esophagocarinoplasty and external esophageal stenting was performed successfully via sternotomy utilizing extracorporeal bypass on DOL 90.

Results: Postoperatively, the patient weaned off mechanical ventilation DOL 104, resting nightly and maintaining oral skills via spit fistula. Repeat bronchoscopy and CT angiogram at DOL 115 and 116 demonstrate widely patent airway with no granulation tissue. He was discharged home DOL 146.

Conclusions: The strength of regionalized children's surgical support, innovation of multidisciplinary teams, and family-centered intervention is necessary when managing a rare and highly mortal condition.

Plenary Session II

Saturday, May 6, 10:30 – 11:30 a.m.

50

STEM CELL ENGRAFTMENT IN THE PROPHYLACTIC TREATMENT OF EXPERIMENTAL NECROTIZING ENTEROCOLITIS

Christopher J. McCulloh, MD, Jacob K. Olson, MD, Yijie Wang, MS, Yu Zhou, MD, Gail E. Besner, MD.

Nationwide Children's Hospital, Columbus, OH, USA.

Purpose: Necrotizing enterocolitis (NEC) is a leading cause of morbidity and mortality in premature infants. We have previously shown equivalent efficacy of four different types of stem cells (SC) in reducing the incidence and severity of NEC. Our current goal was to investigate whether differences in intestinal engraftment of different SC types correlates with protection of the intestines in NEC.

Methods: Newborn rat pups were delivered prematurely by C-section and exposed to experimental NEC (repeated episodes of hypoxia/hypothermia/hypertonic feeds). Pups received $2x10^6$ cells IP of one of the following: amniotic fluid-derived mesenchymal SC (AF-MSC), bone marrow-derived MSC (BM-MSC), enteric NSC (E-NSC), or amniotic fluid-derived neural SC (AF-NSC). Control pups received an equivalent volume of PBS. All SC were derived from rats ubiquitously expressing enhanced green fluorescent protein (EGFP). NEC incidence and severity were determined histologically. SC engraftment was quantified by counting EGFP-positive cells/crypt-villus axis in nine intestinal cross-sections from each of 5 animals/group. A total of 140 crypt-villus axes per group were quantified. Student's t-test was used to determine significance at $p<0.05$.

Results: SC administration reduced the incidence of NEC from 61.3% in untreated pups to 19-23% for the different SC, with no significant differences between SC types (Figure 1A). The number of engrafted SC per crypt-villus axis varied as follows: AF-MSC, 2.35±0.18; BM-MSC 1.94±0.15; E-NSC 3.02±0.21, AF-NSC 4.57±0.30. NSC engraftment was significantly higher than MSC engraftment, with the highest degree of engraftment seen in AF-NSC: AF-NSC *vs.* AF-MSC, $p<0.0001$; AF-NSC *vs.* BM-MSC, $p<0.0001$; E-NSC *vs.* AF-MSC, $p=0.0178$; E-NSC *vs.* BM-MSC, $p<0.0001$ (Figure 1B). Despite these differences, all SC types equivalently protected intestines from NEC.

Conclusions: Although SC protect the intestines from NEC, SC engraftment into injured intestine is relatively low. This suggests that SC exert their beneficial effects, at least in part, by mechanisms that do not require SC engraftment into injured intestine.

Plenary Session II (cont.)

51

ARE ESOPHAGOCRURAL SUTURES NECESSARY DURING A LAPAROSCOPIC FUNDOPLICATION: A PROSPECTIVE RANDOMIZED TRIAL

Shawn D. St.Peter, MD, Ashwini S. Poola, MD, Obinna O. Adibe, MD, David Juang, MD, Jason D. Fraser, MD, Pablo Aguayo, MD, Charles L. Snyder, MD, **George W. Holcomb, MD**.

Children's Mercy Hospital, Kansas City, MO, USA.

Purpose: When performing a fundoplication, many surgeons have been trained to extensively mobilize the esophagus, thereby disrupting its crural attachments. We previously performed a prospective, randomized trial demonstrating that minimal esophageal dissection decreases postoperative wrap herniation and reoperation rates in children. However, in that study comparing minimal to extensive esophageal dissection/mobilization, four esophagocrural (EC) sutures were placed in both groups. In this study, we evaluate the necessity of these EC sutures.

Methods: After IRB approval, patients undergoing laparoscopic fundoplication were randomized to receive four EC sutures or none. There was minimal esophageal dissection in all patients. Exclusion criteria included a preoperative hiatal hernia. The primary outcome variable was postoperative wrap herniation. A sample size of 120 was calculated using herniation data from the prior trial with a power of 0.82, accounting for attrition. A contrast study was planned at approximately 1 year. Telephone follow-up was conducted at a minimum 1.5 years.

Results: 121 patients were enrolled from 2/2010 to 2/2014, as one patient was found with a hiatal hernia at operation and was excluded. 13 did not survive, leaving 53 patients with EC sutures (S) and 54 without (NS). There were no differences in preoperative demographics. Operative time was significantly longer in the S group by a mean of 20 minutes ($P<0.01$). Contrast studies were obtained at one year postoperatively in 62% S and 68% NS patients, and there were no wrap herniations in either cohort ($P=1.0$). There has been one reoperation for wrap loosening in the NS group, none in the S group ($P=1.0$). Final telephone and clinic follow-up was achieved at a median of four years (IQR: 3-4.7). Reflux symptoms and medications were no different at one month, one year and final follow-up.

Conclusions: When minimal phrenoesophageal dissection is performed, placement of EC sutures offers no advantages and increases operative time.

Plenary Session II (cont.)

52

FEEDING ADVANCEMENT AND SIMULTANEOUS TRANSITION TO DISCHARGE (FAST-DISCHARGE) CLINICAL PATHWAY

Ashwini S. Poola, MD, Tolulope A. Oyentunji, MD, MPH, Katrina L. Weaver, MD, Rebecca M. Rentea, MD, Shawn D. St.Peter, MD, Richard J. Hendrickson, MD.

Children's Mercy Hospital, Kansas City, MO, USA.

Purpose: Laparoscopic gastrostomy tube placement (LGT) is a common surgical procedure. However, there is little consensus on post operative feeding regimens. With prior nasogastric feed tolerance, there should be no reason for delay in post operative resumption of feeds and subsequent discharge to home. This is a report on a FAST-Discharge pathway, which to date has not been reported in the literature.

Methods: A retrospective review of patients who underwent outpatient LGT was performed from May 2013 to May 2015. All patients were on prior nasogastric feeds. The post-operative order set initiates feeds in 4 hours to advance to goal as tolerated. Time to initial feed and goal nutrition from arrival to the floor, and overall length of stay (LOS) were calculated from end of operation.

Results: Ninety-two patients were identified with 47% percent being female and a median age of 16 months (IQR 8-31 mo). Initial feeds were started at a median of 3 hours (IQR: 2-5 hrs). Fifty-one percent of patients were started on bolus feeds and 49% had a full volume of feeds at initiation. The median duration to reach goal nutrition was 8.75 hours (IQR: 4-17 hrs). 93% percent of patients reached full feeds within 24 hours with more than half achieved this within 12 hours. Three patients had feeds held for abdominal distention with ultimate resumption of feeds within 24 hours after a normal tube study. The median LOS was 26 hours (IQR: 23-30). More than 75% met discharge criteria by 30 hours after surgery.

Conclusions: In conclusion, an expedited pathway with early feeding and discharge is possible after laparoscopic gastrostomy tube placement with a low risk for adverse events. This can potentially mitigate costs associated with prolonged LOS and provide a more patient-centered approach to care.

Plenary Session II (cont.)

53

OUTCOMES FOLLOWING ELECTIVE RESECTION OF CONGENITAL PULMONARY AIRWAY MALFORMATIONS IS EQUIVALENT AFTER 3 MONTHS OF AGE AND A WEIGHT OF FIVE KILLOGRAMS

Brian C. Gulack, MD, MHS, Harold L. Leraas, BS, Brian Ezekian, MD, Jina Kim, MD, Christopher Reed, MD, Obinna O. Adibe, MD, Henry E. Rice, MD, Elisabeth T. Tracy, MD.
Duke University, Durham, NC, USA.

Purpose: Elective resection of congenital pulmonary airway malformations (CPAMs) is performed to reduce the risk of recurrent infection and malignant transformation. There is, however, substantial variation in the timing of resection. We performed this study in order to determine the association of age and weight on outcomes following elective resection of CPAMs.

Methods: The American College of Surgeons National Surgical Quality Improvement Program-Pediatric database from 2012-2014 was queried for infants undergoing elective lung resection for a CPAM. Infants were categorized based on pre-determined groups by age in months (0-3, 3-6, 6-9, 9-12, and greater than 12 months) and weight in kg (0-5, 5-10, and greater than 10 kg) at the time of operation. Groups were compared for baseline characteristics and outcomes. A morbidity composite was created including post-operative pneumonia, reintubation, ventilator days greater than zero, reoperation, readmission, post-operative hospital length of stay greater than seven days, and mortality in order to compare groups.

Results: A total of 311 infants met study criteria. There were no postoperative mortalities. The morbidity composite was significantly more common among infants <3 months of age compared to infants >3 months of age (31.2% vs. 15.6%, p=0.01, Table). The morbidity composite was also significantly more common among infants <5 kilograms as compared to infants >5 kilograms (37.5% vs. 15.8%, p<0.01).

Conclusions: We conclude that infants should be observed until three months of age and five kilograms prior to elective resection of congenital pulmonary airway malformations, but that there does not appear to be any additional benefit in delaying resection beyond these cutoffs.

Plenary Session II (cont.)

Patient Characteristics and Outcomes by Age at Operation

	Overall (N=311)	0-3 Months (N=48)	3-6 Months (N=71)	6-9 Months (N=81)	9-12 Months (N=36)	12+ Months (N=75)
Thoracoscopic Approach	108 (48.4%)	14 (45.2%)	0 (40.8%)	38 (64.4%)	13 (54.2%)	23 (38.3%)
Operative Time (min)	155 (111, 213.5)	110 (81, 165)	156 (109, 210)	148 (114, 205)	183 (146, 233)	172 (127, 239)
Post-Operative Pneumonia	3 (1.0%)	0 (0%)	1 (1.4%)	0 (0%)	1 (2.8%)	1 (1.3%)
Unplanned Reintubation	5 (1.6%)	1 (2.1%)	2 (2.8%)	0 (0%)	1 (2.8%)	1 (1.3%)
Ventilator Use Post Operatively	14 (4.5%)	7 (14.6%)	1 (1.4%)	3 (3.7%)	1 (2.8%)	2 (2.7%)
Bleeding Requiring Transfusion	19 (6.1%)	6 (12.5%)	5 (7.0%)	3 (3.7%)	1 (2.8%)	4 (5.3%)
Post-Operative LOS > 7 Days	27 (8.7%)	9 (18.8%)	3 (4.2%)	5 (6.2%)	2 (5.6%)	8 (10.7%)
Readmission Within 30 Days	14 (4.5%)	1 (2.1%)	1 (1.4%)	4 (4.9%)	3 (8.3%)	5 (6.7%)
Morbidity Composite	56 (18.0%)	15 (31.2%)	10 (14.1%)	11 (13.6%)	5 (13.9%)	15 (20.0%)

Plenary Session II (cont.)

54

PRE-ACTIVATION OF INVARIANT NATURAL KILLER T CELLS REDUCES INFLAMMATION AND IMPROVES SURVIVAL IN MURINE NEONATAL SEPSIS

Alexandra C. Bolognese, MD[1], Weng-Lang Yang, PhD[2], Laura W. Hansen, MD[3], Archna Sharma, PhD[2], Jose M. Prince, MD[3], Jeffrey M. Nicastro, MD[3], Gene F. Coppa, MD[3], Ping Wang, MD[2].

[1]Elmezzi Graduate School of Molecular Medicine, Manhasset, NY, USA, [2]The Feinstein Institute for Medical Research, Manhasset, NY, USA, [3]Hofstra Northwell School of Medicine, Manhasset, NY, USA.

Purpose: Neonates possess an immature adaptive immune system and exhibit an unchecked innate immune response, making them especially vulnerable to sepsis. In adult mice, invariant natural killer T (iNKT) cells rapidly produce cytokines following activation and subsequently exhibit long-term anergy. We hypothesized that pre-activation of iNKT cells would be protective in neonatal sepsis.

Methods: C57BL/6 mouse pups (5-7d, n=6-9 per group) received intraperitoneal injection of the iNKT stimulator KRN7000 (KRN, 0.2 μg/g, an α-galactosylceramide analog) or vehicle (2.5% DMSO in PBS). Thirty hours later sepsis was induced by intraperitoneal injection of adult cecal slurry. Ten hours after sepsis induction blood and tissues were collected for various analyses. Hepatocytes were analyzed by flow cytometry. For the survival study, pups were monitored for seven days.

Results: KRN treatment resulted in activation of iNKT cells, demonstrated by a significant increase in $CD69^+$ hepatic iNKT cells from 7.3 to 18.1%, and serum IFN-γ level from 1 to 235 pg/mL after 10 hours. When sepsis was induced 30 hours after KRN treatment, the frequency of activated iNKT cells was decreased by 31% compared to vehicle (13.2 vs. 9.1%, $p < 0.05$). Similarly, serum IFN-γ and IL-6 levels were decreased by 56% and 29%, respectively (IFN-γ: 475 vs. 209 pg/mL, IL-6: 48 vs. 34 ng/mL, $p < 0.05$). Lung mRNA levels of cytokines IL-6 and IL-1β and neutrophil chemokine KC were also significantly reduced in the KRN-treated pups compared to vehicle. Lastly, pre-treatment with KRN resulted in a 38% 7-day survival rate compared to no survival in the vehicle-treated group (Figure).

Conclusions: Pre-activation of iNKT cells with KRN shows a protective effect in septic neonates by reducing systemic and pulmonary inflammation and increasing survival, demonstrating its potential as a therapeutic strategy in neonatal sepsis.

Plenary Session II (cont.)

55

SURGICAL APPROACH AND TRANSANASTAMOTIC TUBES IN THE REPAIR OF TRACHEOESOPHAGEAL FISTULAE

Joseph C. Fusco, MD, Juan L. Calisto, MD, Marcus M. Malek, MD.
Children's Hospital of Pittsburgh of UPMC, Pittsburgh, PA, USA.

Purpose: Tracheoesophageal Fistula (TEF) occurs with an incidence of 1 in 3500 births. Definitive management consists of surgical fistula ligation with esophageal primary anastomosis. Early complications include leak and stricture. The technique has often been debated in the literature with no clear answer regarding approach or the use of a transanastomotic tube (TAT).

Methods: We performed a retrospective chart review of all TEF repairs over the course of fifteen years at a single institution. These repairs varied from those that were started thoracoscopically, those that were completed thoracoscopically, and those that were repaired via thoracotomy. We also identified cases in which a TAT was utilized. These repairs were followed to assess for leak and stricture.

Results: We identified 110 TEF repairs, 94 were approached open and 16 were started thoracoscopically with 6 being completed that way. There was no difference in the stricture rate ($p=0.74$) or leak rate ($p=0.95$) when comparing the open to those begun thoracoscopically. This result holds when further categorizing the repairs that were completed thoracoscopically ($p=0.31$ and $p=0.73$, respectively). The use of a TAT predisposes the patient to stricture regardless of approach. The stricture rate with the TAT approached 56% versus 17% without the TAT ($p<0.0005$). The leak rate with or without a TAT shows no difference ($p=0.27$).

Conclusion: This series is the largest to date that evaluates the incidence of stricture and leak among surgical approaches. These data represent no difference in stricture or leak rate in cases started thoracoscopically and also suggest no differences in cases completed that way. More importantly, these data show a much higher stricture rate with the use of a TAT without an increase in leak rate. The consideration of curtailing the use of TATs must be undertaken, and future prospective investigation is certainly warranted to further evaluate these findings.

Plenary Session II (cont.)

56

ERYTHROPOIETIN PREVENTS ANEMIA AND THE NEED FOR TRANSFUSION IN PREMATURE LAMBS SUPPORTED BY AN EXTRACORPOREAL ENVIRONMENT FOR NEONATAL DEVELOPMENT

Ali Y. Mejaddam, MD, Matthew A. Hornick, MD, Patrick E. McGovern, MD, Grace Hwang, BS, Kathleen Young, BS, Kendall M. Lawrence, MD, Heron D. Baumgarten, MD, Avery C. Rossidis, MD, Emily A. Partridge, MD, PhD, William H. Peranteau, MD, Marcus G. Davey, PhD, Alan W. Flake, MD.

Children's Hospital of Philadelphia, Philadelphia, PA, USA.

Purpose: We have developed an Extracorporeal Environment for Neonatal Development (EXTEND) that provides physiologic support of extremely premature lamb fetuses for up to 28 days. Anemia, and the need for transfusion, are undesirable consequences of EXTEND caused by phlebotomy and a reduction in erythropoietin (EPO) production. Here, we assess the efficacy of exogenous EPO to prevent anemia and avoid the need for transfusion.

Methods: 12 preterm lambs were cannulated at gestational age 105-115 days (term ~ 145 days) and supported on EXTEND for up to 4 weeks. Lambs were divided into three groups: (1) "no EPO" (n=4); (2) "low EPO", 300U/kg/day (n=4); (3) "high EPO", 800U/kg/day (n=4). Daily hematocrit and weekly complete blood count and chemistry panels were assessed. An additional four lamb fetuses remained in utero after jugular vein catheterization and served as controls.

Results: Mean percentage change in hematocrit from baseline was significantly different between groups (no EPO -34% vs. low EPO -19% vs. high EPO +1%; p=0.02). This occurred despite a greater median number of blood transfusions (3.5 vs. 1 vs. 0; p=0.02) and a greater median volume of transfusion (137.5ml vs. 24ml vs. 0ml; p=0.01) in the "no EPO" group. Phlebotomy losses were similar between the groups (p=0.41). MCV was significantly higher with erythropoietin (no EPO 37.5fL vs low EPO 44.2fL vs. high EPO 46.3fL; p=0.01) while serum iron was similar in all groups. Platelet counts were higher in the "high EPO" group (196,000/uL vs. 236,000/uL vs. 426,000/uL; p=0.03). No adverse effects were noted. The "high EPO" group was comparable to in utero control fetuses with respect to percentage change in hematocrit (p=0.33), MCV (p=0.19), platelet count (p=0.26), and serum iron (p=0.66).

Conclusion: Daily intravenous erythropoietin (800U/kg) prevents a decline in hemoglobin, eliminates transfusion requirements and restores normal RBC indices in fetal lambs supported by an extracorporeal environment for neonatal development.

Scientific Session V

Scientific Session V: Oncology
Saturday, May 6, 2:00 – 3:00 p.m.

57

LIVER TRANSPLANTATION FOR PRIMARY HEPATIC MALIGNANCIES OF CHILDHOOD: THE UNOS EXPERIENCE

Julius Balogh, MD, MHA[1], Duc T. Nguyen, MD, PhD[1], Edward A. Graviss, PhD, MPH[1], **Emma C. Hamilton, MD**[2], Andras A. Heczey, MD[3], Mary T. Austin, MD, MPH[4].

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Purpose: To determine factors associated with patient and graft survival following orthotopic liver transplantation (OLT) in children and adolescents with primary hepatic malignancies.

Methods: The United Network for Organ Sharing (UNOS) database was queried for all patients <18 years old who received an OLT with a primary malignant liver tumor between 1987-2012 (n=487). Patients were categorized as hepatoblastoma (HB), hepatocellular carcinoma (HCC) or other. Comparisons across groups were made using Kruskal Wallis test for continuous and Chi-square or Fisher's exact test for categorical variables. 5-year patient and graft survival were determined using Kaplan-Meier methodology and independent predictors of survival were determined using multivariate Cox proportional hazards model.

Results: The majority of patients were diagnosed with HB (n=340, 70%) with 72 HCC (15%) and 75 other (15%). HCC patients were older, more often hospitalized at the time of transplant, and more like to receive a cadaveric organ compared to HB patients. 5-year patient and graft survival for the entire cohort was 71% and 72%, respectively with the majority of deaths due to malignancy. Factors associated with increased risk of death by univariate analysis included HCC diagnosis; earlier transplant era; older age; medical condition hospitalized at transplant; lower serum albumin; higher total bilirubin, creatinine, and INR; and longer cold ischemic time (CIT). Independent predictors of 5-year patient and graft survival included diagnosis, transplant era, medical condition at transplant, and CIT (Table 1).

Conclusions: In recent years, there has been significant improvement in post-transplant patient and graft survival for children and adolescents with primary hepatic malignancies. However, patients with HCC continue to fare worse than those with other cancer types.

Scientific Session V (cont.)

Table 1. Multivariate Cox proportional hazards model with missing data level < 10%, sample size = 452.

		5-year patient survival (HR, 95% CI)	5-year graft survival (HR, 95% CI)
Cancer Type	HCC	1.60 (1.04, 2.48)	1.64 (1.06, 2.55)
Reference HB	Other	1.06 (0.62, 1.80)	1.08 (0.64, 1.85)
Transplant Era	2/27/2002-9/14/2009	0.59 (0.40, 0.89)	0.59 (0.39, 0.88)
Reference Before 2/27/2002	9/15/2009-12/31/2012	0.42 (0.25, 0.71)	0.42 (0.25, 0.71)
Medical Condition at Transplant	Hospitalized, non-ICU	1.94 (1.26, 2.99)	1.85 (1.19, 2.87)
Reference Not hospitalized	Hospitalized, ICU	2.25 (1.37, 3.70)	2.24 (1.36, 3.68)
Cold Ischemic Time (hour)		1.03 (1.00, 1.07)	1.03 (1.00, 1.07)

Scientific Session V (cont.)

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SUSTAINED INHIBITION OF TUMOR GROWTH BY COMBINED HIGH DOSE RADIATION AND CHECKPOINT BLOCKADE IN A SYNGENEIC MOUSE MODEL OF HIGH RISK NEUROBLASTOMA

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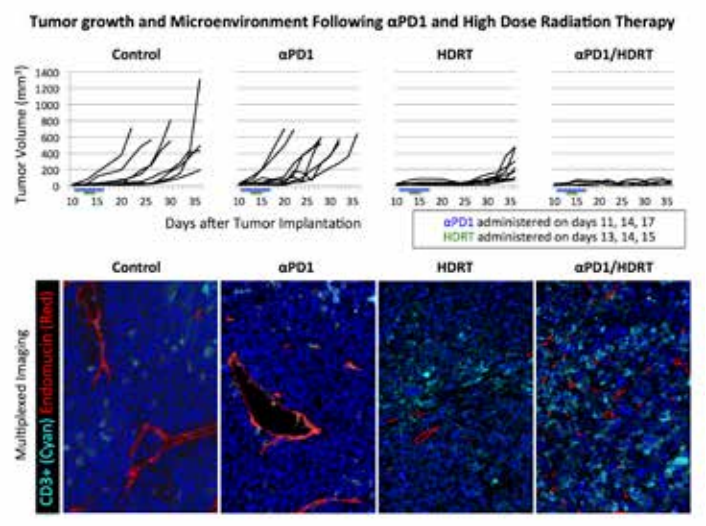
Purpose: Checkpoint blockade inhibits the PD1 pathway to augment anti-tumor host immunity. PD1 is expressed in high-risk neuroblastoma (NBL), which continues to carry a poor prognosis despite multimodal therapy. High-dose radiation therapy (HDRT) upregulates T-cell activation and infiltration into the tumor microenvironment (TME), and has a cytotoxic effect on tumor vasculature. The effect of combined treatment on tumor vasculature is unknown. We hypothesized that combined HDRT/αPD1 treatment of NBL tumors will augment T-cell infiltration and inhibit angiogenesis to impede tumor growth.

Methods: Experiments were performed with IACUC approval. Syngeneic NBL tumorgrafts were established in C57Bl/6 mice using the murine 9464D cell line. Tumors were monitored by ultrasound to a target volume of 500mm^3. Mice (n=47) were randomized to four treatment arms: control, αPD1, HDRT, or combined HDRT/αPD1. Tumor growth was monitored by ultrasound and bioluminescence. Mice were euthanized once tumors reached target flux. Tissues were analyzed with multiplexed biomarker imaging, MANTRA™, to characterize vasculature and immune phenotype.

Results: HDRT/αPD1 was more effective than both HDRT and αPD1 alone in inhibiting tumor growth ($P < 0.01$). Endomucin staining for tumor endothelium showed numerous small, poorly organized vessels in HDRT/αPD1 tumors, compared to larger, well-formed, branching vessels in the control and αPD1 groups. HDRT treated tumor vessels appeared similar in phenotype to HDRT/αPD1 vessels. αSMA staining for vascular mural cells displayed disassociation of this protective layer from the endothelium, most pronounced in the HDRT/αPD1 tumors. Increased CD3+ T-cell infiltrate was observed in HDRT/αPD1 tumors, clustered around the vasculature.

Conclusions: Combined HDRT/αPD1 NBL tumors showed sustained inhibition of tumor growth. HDRT/αPD1 treated tumors displayed numerous, poorly formed immature vessels and increased CD3+ immune infiltrate. We propose that growth inhibition of combined treatment tumors is mediated by augmented disruption of vasculature. Further studies will delineate the evolving effect of combined HDRT/αPD1 therapy on the TME.

Scientific Session V (cont.)



Scientific Session V (cont.)

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USE OF INTRAOPERATIVE NUCLEAR IMAGING LEADS TO DECREASED ANESTHESIA TIME AND REAL-TIME CONFIRMATION OF LESION REMOVAL

Joseph C. Fusco, MD, Michael Czachowski, MBA, Alexander Davit III, MD, Judith Joyce, MD, Kevin Mollen, MD, Stefan Scholz, MD, Lorelei Grunwaldt, MD, Barbara Gaines, MD, Marcus Malek, MD.

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Purpose: Lymphatic mapping to guide sentinel lymph node biopsy (SLNB) typically requires lymphoscintigraphy prior to surgery. In young pediatric patients, this process usually requires intubation in the nuclear medicine suite followed by transport to the operating room (OR). We present a method utilizing intraoperative nuclear imaging to decrease anesthesia time, avoid transport of the intubated child, and confirm removal of the lesions in real-time.

Methods: We review 14 pediatric cases in which the portable nuclear imaging camera was utilized to perform the entirety of the SLNB in the OR. We reviewed the cases for anesthetic time, findings, and outcomes, and compared them to a similar set of patients who underwent conventional lymphoscintigraphy in the nuclear medicine suite.

Results: Time under anesthesia was reduced from a mean of 267 minutes when lymphoscintigraphy is performed in nuclear medicine compared to 206 minutes when performed in the OR during the procedure. There were no adverse events in either group. There were two cases where intraoperative lymphoscintigraphy identified additional areas of significant uptake after the surgeon thought all involved nodes were removed. This allowed for immediate removal of these nodes. In all cases, the nuclear medicine camera confirmed removal of the nodes of interest at the end of the case.

Conclusion: The use of intraoperative lymphoscintigraphy has several important benefits. We demonstrate a significant decrease in time under anesthesia by using the portable nuclear medicine camera in the OR, a method that also prevents the need to transport an intubated child. SLNB is an extremely valuable technique, but some series show a failure to biopsy the correct node in up to 20% of patients. Indeed, in our study, 2 of 14 patients had significant lesions remaining after initial biopsy. Post-excision lymphoscintigraphy allows for confirmation of lesion removal, which will help to avoid such cases.

Scientific Session V (cont.)

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NODAL STAGING GUIDELINES FOR ADULT MELANOMA MAY NOT APPLY TO CHILDREN

Jina Kim, MD, Zhifei Sun, MD, Brian R. Englum, MD, Brian Ezekian, MD, Christopher R. Reed, MD, Harold J. Leraas, BS, Neel Nath, BS, Paul J. Mosca, MD, PhD, Elisabeth T. Tracy, MD.

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Purpose: Pediatric melanoma demonstrates different clinical presentation and outcomes when compared to adult melanoma. However, the adult melanoma staging system has been applied to children without age-specific studies to support this practice. Therefore, we evaluated the prognostic accuracy of the adult melanoma nodal staging system in children.

Methods: All patients diagnosed with invasive cutaneous melanoma associated with pathologically positive lymph nodes were identified from the 1998 - 2012 National Cancer Data Base. The cohort was then divided into two age groups: 0-19 years (children) and ≥ 20 years (adults). Multivariable regression models utilizing restricted cubic splines (RCS) were used to assess the association between number of metastatic lymph nodes and overall survival (OS).

Results: In total, 27,153 patients met study criteria: 26,545 (97.8%) adults and 608 (2.2%) children. Among adults, N2 stage (2-3 nodes) and N3 stage (≥ 4 nodes) were associated with worse OS, compared to N1 stage (N2: adjusted hazard ratio [HR] 1.46, 95% confidence interval [CI] 1.37 - 1.55, $p < 0.001$; N3: HR 2.63, 95% CI 2.43 - 2.84, $p < 0.001$). However, using the same nodal staging system in children did not effectively discriminate differences in OS [N2 vs. N1: $p = 0.10$; N3 vs. N1: $p = 0.24$). Alternatively, using RCS analysis, we found that the threshold for OS difference occurred at 3 positive nodes for children with melanoma. The first two positive lymph nodes were associated with increasingly worse survival in children (HR 2.74, 95% CI 1.17 - 6.42, $p = 0.02$), while any additional positive node beyond the first two was not (HR 0.87, 95% CI 0.62 - 1.23, $p = 0.43$).

Conclusions: Nodal staging criteria for adult melanoma may not provide accurate prognostic information for pediatric melanoma. Our findings suggest that children with melanoma may benefit from development of an age-specific staging system.

Scientific Session V (cont.)

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EPIDERMAL GROWTH FACTOR RECEPTOR (EGFR) INHIBITION DECREASES METASTASIS IN A MURINE MODEL OF OSTEOSARCOMA

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Purpose: Osteosarcoma (OS) carries a poor prognosis due to early metastasis. While pro-inflammatory M1 macrophages exhibit anti-tumor activity, M2 macrophages may contribute to malignant progression and metastasis. We have previously shown that macrophages significantly promote invasion and proliferation of murine OS and invasion is blocked *in vitro* by pre-treatment of macrophages with the epidermal growth factor receptor (EGFR) inhibitor gefitinib ($p<0.001$). We sought to confirm these findings in human OS, elucidate the mechanism by which gefitinib impacts macrophage-promoted invasion *in vitro* and determine its effects *in vivo* as a potential anti-metastatic agent.

Methods: *In vitro,* murine (K7M2) or human (U2OS) OS cells were incubated alone or with murine bone marrow-derived macrophages ± the EGFR inhibitor gefitinib (0.5 υM). Invasive capacity was assessed utilizing Matrigel invasion assays. RNA from macrophages was collected and pathway-focused gene array for inflammatory markers was performed. *In vivo*, murine OS cells were implanted into the tibia of BALB/c mice (n=16). Mice were treated with gefitinib or control chow for 4 weeks. Lung parenchyma was assessed for metastases utilizing H&E staining and pathologic examination.

Results: *In vitro*, macrophages promoted human U2OS invasion ($p<0.01$) which was blocked by gefitinib ($p<0.01$). Gefitinib up-regulated the expression of pro-inflammatory M1 markers in macrophages, including inducible nitric oxide synthase (400-fold) and granulocyte macrophage colony stimulating factor (300-fold). *In vivo*, primary tumor volume was not affected by gefitinib treatment. All control mice developed macrometastatic disease. Four of 9 gefitnib-treated mice had no macrometastases and micrometastases in gefitinib-treated mice were small and confined to the vasculature. Overall metastatic tumor burden was significantly reduced in the mice that responded to gefitinib treatment ($p<0.01$).

Conclusions: EGFR inhibition of macrophages inhibits OS invasion and may inhibit metastatic disease. Gefitnib reprograms macrophages in the tumor microenvironment and provides a novel therapeutic option for the prevention of OS metastasis.

Scientific Session V (cont.)

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IMAGE BASED SURGICAL GUIDELINES ARE ASSOCIATED WITH INCREASED CURATIVE SURGICAL RESECTION IN HEPATOBLASTOMA: A REPORT FROM THE CHILDREN'S ONCOLOGY GROUP AHEP-0731 TRIAL

Rebecka L. Meyers, MD[1], Gregory M. Tiao, MD[2], Max R. Langham, Jr., MD[3], Eugene D. McGahren, MD[4], Stephen P. Dunn, MD[5], Christopher B. Weldon, MD, PhD[6], Marcio H. Malogolowkin, MD[7], Wayne L. Furman, MD[8], Mary Beth McCarville, MD[8], Alex J. Towbin, MD[2], Milton J. Finegold, MD[9], Sarangarajan Ranganathan, MD[10], Mark Krailo, PhD[11], Howard M. Katzenstein, MD[12].

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Purpose: Delayed surgical resection of hepatoblastoma (HB) was achieved in 57% of non-metastatic, and 28% of metastatic, patients in previous COG trials. AHEP-0731 investigated image based surgical guidelines with the goal of protocol driven timely conventional resection, or early referral for liver transplant evaluation for those with potentially unresectable HB. We report the results using these guidelines in AHEP-0731 for those tumors unresectable at diagnosis.

Methods: An image based risk stratified treatment system was utilized. Non-metastatic tumors unresectable at diagnosis were defined as Intermediate-Risk (IR) and received 6 cycles of cisplatin/5FU/vincristine/doxorubicin(C5VD). Patients with distant metastatic disease were considered High-Risk (HR) and received C5VD and additional vincristine/irinotecan(VI). Recommendations for resection or early referral for transplant evaluation were dependent on PRETEXT/POST-TEXT scores that were centrally reviewed by a committee of surgeons and radiologists.

Results: 125 evaluable children with HB not resected at diagnosis were enrolled September 2009 to March 2012; 95 patients with IR, and 30 patients with HR. Median age 15 months (0-192mo). **TABLE 1** shows PRETEXT Group (I,II,III,IV); Annotation Factors (V,P,E,F,R,M); timing, and type of surgical resections. 105/125 children (89% IR and 70% HR) had complete resection of their tumor; 71 had conventional resection and 34 patients had liver transplantation. Event-free survival was 87%(CI:76-94) for IR; and 49%(CI:30-65) for HR. Overall survival was 94%(CI:87-97) for IR; and 62%(CI:42-77) for HR.

Conclusion: Image based guidelines for surgical treatment, combined with C5V-D chemotherapy, significantly improved the complete resection rate and survival for IR and HR patients in AHEP-0731 compared with previous COG trials. Image based surgical guidelines will be important components of future HB trials.

Scientific Session V (cont.)

Table 1. Characteristics of hepatoblastoma not resected at diagnosis on COG AHEP-0731

PRETEXT Group	PRETEXT Annotation Factors*	Conventional Resectionafter C5VD Chemotherapy	Liver Transplant after C5VD Chemotherapy
I = 0	V = 90	after 2 cycles = 19	after 2 cycles = 2
II = 36	P = 89	after 4 cycles = 50	after 4 cycles = 23
III = 61	E = 2	after 6 cycles = 2	after 6 cycles = 5
IV = 28	F = 29		Incomplete Data = 4
	R = **		
	M = 30	**TOTAL = 71**	**TOTAL = 34**

*PRETEXT Annotation Factor Definitions: V (all three hepatic veins or retrohepatic IVC); P (portal bifurcation or both R and L); E (contiguous extrahepatic); F (multifocal); R (tumor rupture at diagnosis); M (distant metastatic, usually lungs)

**Data for tumor rupture at diagnosis was not routinely collected

Scientific Session V (cont.)

63

THE IN VITRO AND IN VIVO EFFICACY OF ACTIVATED NATURAL KILLER CELLS COMBINED WITH ANTI-GD2 ANTIBODY IN NEUROBLASTOMA

Wesley E. Barry, MD, Jeremy R. Jackson, MD, Grace Asuelime, MA, Hong-wei Wu, MD, Jianping Sun, PhD, Larry Wang, MD, PhD, Robert C. Seeger, MD, Eugene S. Kim, MD.
Children's Hospital Los Angeles, Los Angeles, CA, USA.

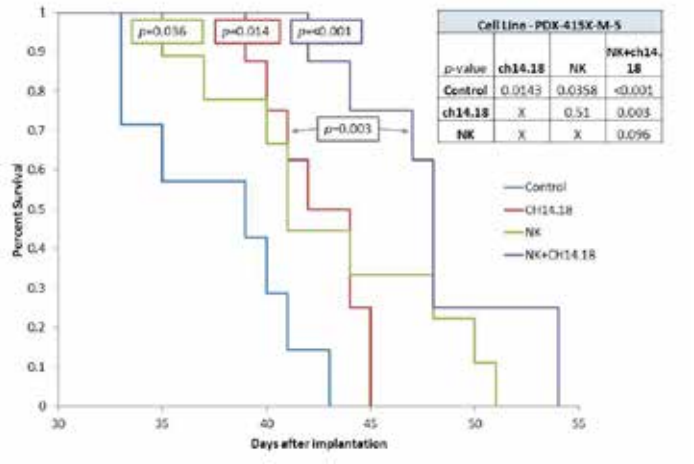
Purpose: High-risk neuroblastoma (NB) portends a poor prognosis with most patients succumbing to recurrent, metastatic disease following surgical resection. Targeted immunotherapy with anti-GD2 antibody (ch14.18) is currently used in patients with high-risk disease. Despite improvement in outcomes, mortality in this group remains high. Previous in vitro studies have shown that combining activated natural killer (NK) cells to ch14.18 may improve its efficacy. We hypothesize that the addition of activated NK cells to ch14.18 will lead to decreased malignant potential in vitro and decreased metastatic disease and increased survival in a murine neuroblastoma model of minimal residual disease (MRD).

Methods: Using human neuroblastoma cell lines (CHLA 255, CHLA 136, SH-SY5Y), DIMSCAN cell viability and Matrigel invasion assays were performed. In vivo, 1 million patient-derived NB cells (COG PDX-415X-M-5) were injected into the renal capsule of 33 NSG mice. The primary tumor was resected 7 days post-injection, and mice were randomly assigned to 4 treatment arms; control, antibody alone, NK alone or combination. Mice underwent treatment twice weekly for 4 weeks. Metastases to liver and bone marrow were assessed by histology. Survival was analyzed using log-rank analysis, metastasis with Fisher's exact test, and in vitro studies with Student's t-test.

Results: In vitro, the combination of NK cells and ch14.18 led to a significant increase in cytotoxicity (DIMSCAN) and decreased invasiveness (Matrigel assay) compared to control ($p<0.001$ for both). In vivo, survival was significantly increased in mice treated with combination therapy compared to control mice ($p<0.001$)(Figure), and the incidence of metastasis was significantly decreased in mice treated with combination therapy ($p=0.013$).

Conclusions: The combination of activated NK cells and ch14.18 demonstrates potent in vitro efficacy as well as improved survival and decreased metastasis in a metastatic minimal residual disease model of neuroblastoma. This novel combination may serve as an important adjuvant therapy for children with high-risk NB.

Scientific Session V (cont.)



Cell Line - PDX-415X-M-S			
p-value	ch14.18	NK	NK+ch14.18
Control	0.0143	0.0358	<0.001
ch14.18	X	0.51	0.003
NK	X	X	0.096

Video Session

Video Session
Saturday, May 6, 3:00 – 4:00 p.m.

V1

INDOCYANINE GREEN FLUOROESCENCE CHOLANGIOGRAPHY DURING LAPAROSCOPIC CHOLECYSTECTOMY

Claire Graves, MD[1], Olajire Idowu, MD[2], Christopher R. Newton, MD[2], Sunghoon Kim, MD[2].

[1]UCSF Benioff Children's Hospital, San Francisco, CA, USA, [2]UCSF Benioff Children's Hospital, Oakland, CA, USA.

Tweet about it: indocyanine green

Purpose: Laparoscopic cholecystectomy is a common procedure performed by pediatric surgeons. Though rare, with an incidence of approximately 0.4% in the pediatric population, bile duct injury is a serious complication often requiring complex reconstruction. Aberrant or distorted anatomy often contributes to biliary injuries, and accurate identification of the anatomy is paramount. Indocyanine Green (ICG) fluorescence, visualized with near-infrared (NIR) imaging, improves visualization and provides detailed anatomical mapping of the biliary structures. Though increasingly used in adults via intravenous administration, this video demonstrates the first human use of ICG injected directly into the gallbladder during laparoscopic cholecystectomy.

Methods: Our patient is a 17-year-old female who presented with biliary colic. A 0.25mg/ml ICG solution is prepared on the surgical backtable. A laparoscopic tower with NIR imaging capability is used. After traditional 4-port access is obtained, a needle-tip cholangiogram catheter is used to puncture the infundibulum of the gallbladder. 9ml of bile is drained and mixed with 1ml of the ICG solution to create a 0.025 mg/ml ICG and bile solution. The ICG and bile solution is then re-injected into the gallbladder. The pre-mixed solution fluoresces under NIR light immediately upon injection with no lag time, quickly filling the gallbladder and extrahepatic biliary system.

Results: ICG fluorescence aids significantly in the visualization of the gallbladder, cystic duct and common bile duct. When dissecting the gallbladder from the liver bed, this technique shows a well-defined plane and can be used to identify accessory bile ducts.

Conclusion: We demonstrate the first case of direct administration of ICG into the gallbladder during laparoscopic cholecystectomy. This technique is safe, avoids radiation and can be easily adopted by surgeons to improve visualization of the biliary tree.

Video Session (cont.)

V2

LAPAROSCOPIC RESECTION OF BILATERAL OVARIAN CYSTIC TERATOMAS WITH OVARIAN SPARING SURGERY

Lorraine I. Kelley-Quon, MD, MSHS, Carlos Reck, MD, Geri D. Hewitt, MD, Jennifer H. Aldrink, MD.

Nationwide Children's Hospital, Columbus, OH, USA.

Tweet about it: Laparoscopic ovarian sparing surgery is possible for benign ovarian masses! #SavetheOvaries

Purpose: Most ovarian masses (80-90%) identified in girls and young women are benign. Preoperative risk stratification, using ultrasound characteristics and serum tumor markers, has been shown to identify patients with increased risk of malignancy. Patients with reassuring preoperative risk stratification are good candidates for ovarian sparing surgery instead of oophorectomy. Ovarian sparing surgery involves excising the ovarian mass while sparing the overlying normal, functional ovarian tissue. It is important for surgeons to consider ovarian sparing surgery when possible, as oophorectomy is associated with impaired fertility and earlier onset of menopause. Furthermore, preoperative risk stratification and ovarian sparing surgery for adnexal masses in girls and young women is supported by the American College of Obstetricians and Gynecologists. However, few pediatric surgeons receive formal surgical training in this technique.

Methods: Preoperative risk stratification based on reassuring ultrasound findings and serum tumor markers suggested a low risk of malignancy and therefore laparoscopic bilateral ovarian sparing surgery was planned. The preoperative diagnosis was bilateral benign cystic teratomas. Initial intraoperative assessment supported the preoperative risk assessment and a bilateral laparoscopic ovarian sparing surgery was performed.

Results: Final pathology confirmed bilateral benign cystic teratomas. The patient had an uneventful postoperative course and will be followed with periodic ultrasounds to monitor for recurrence.

Conclusions: This case demonstrates appropriate preoperative risk stratification, intraoperative assessment, and surgical intervention with ovarian sparing surgery in a young woman who presented with bilateral adnexal masses. It highlights a surgical technique not routinely emphasized in pediatric surgical training. For patients with low risk of malignancy, ovarian sparing surgery can be performed laparoscopically and offers the best chance at future fertility and hormonal homeostasis.

Video Session (cont.)

V3

ROBOTIC LONGITUDINAL PANCREATICOJEJUNOSTOMY (PEUSTOW) FOR CHRONIC PANCREATITIS IN AN ADOLESCENT

Anna F. Tyson, MD, MPH, Daniel A. Bambini, MD, John B. Martinie, MD.
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Purpose: A fifteen-year-old Hispanic girl presented with a brief history of nausea, vomiting and severe abdominal pain. She had no prior episodes of pain, but reported a remote history of blunt abdominal trauma from a bicycle handle injury. Workup revealed evidence of chronic pancreatitis with diffuse calcifications throughout the pancreas and a dilated, tortuous pancreatic duct. This abstract describes robotic longitudinal pancreaticojejunostomy for management of her disease.

Methods: After thorough and appropriate preoperative workup, the patient underwent robotic longitudinal pancreaticojejunostomy. This was accomplished using three 8mm and two 12mm ports. The gastrocolic omentum was opened using a vessel sealing device, and the stomach was suspended. The pancreatic duct was identified using ultrasound and opened using monopolar scissors. A Roux limb was created 20cm distal to the ligament of Treitz and brought retrocolic to form the pancreaticojejunostomy. The side-to-side jejunal enteroenterostomy was created using a robotic stapler and the common enterotomy was sutured closed. Finally, the longitudinal pancreaticojejunostomy was sutured using a series of running monofilament absorbable barbed sutures.

Results: The patient tolerated the procedure well. Amylase level from the surgically placed drain was normal after eating, and the drain was removed prior to discharge on postoperative day five. She has subsequently been seen in clinic and is doing well 3 months out from surgery. She has no pain with eating and has returned to her normal activities.

Conclusions: Surgical treatment of chronic pancreatitis in children is rare and is difficult to perform using traditional laparoscopic techniques. We conclude that totally robotic longitudinal pancreaticojejunostomy is a safe and effective option for management of chronic pancreatitis with a dilated distal pancreatic duct in appropriately sized children. This minimally-invasive technique allows a faster recovery and improved cosmesis compared to a traditional open approach.

Video Session (cont.)

V4

PENTALOGY OF CANTRELL WITH A LEFT VENTRICULAR DIVERTICULUM - A ONE-STAGE REPAIR OF A COMPLEX THORACOABDOMINAL DEFECT

Alfred F. Trappey, III, MD, Shinjiro Hirose, MD, Gary Raff, MD, Jacob T. Stephenson, MD.
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We demonstrate the surgical management of a term infant with a covered pentalogy of Cantrell. Pre and postnatal findings included ectopic cordis, a left ventricular diverticulum, an atrial septal defect, and an omphalocele (3x5 cm). Postnatal MRI demonstrated a defect in the anterior diaphragm allowing the left ventricular diverticulum to herniate underneath the sternum. Uniquely, the patient was able to be discharged and returned for a semi-elective repair at 7 weeks. The operation was performed jointly by the pediatric cardiothoracic and general surgery services. Goals of surgery were excision of the left ventricular diverticulum and re-establishment of thoracic and abdominal compartmentalization. The left ventricular diverticulum was excised on cardiopulmonary bypass. The thoracoabdominal defect was repaired with a diaphragmatic flap superiorly and a gore-tex patch inferiorly. The use of the diaphragm as both coverage for the thoracic defect and as a partition between the abdomen and thorax represents an attempt at physiologic repair. The total operative time for this single-stage repair was 4 hours. The patient was able to be discharged home from the ICU 10 days post-operatively.

Video Session (cont.)

V5

RIGHT-SIDED THORACOSCOPIC REPAIR OF ESOPHAGEAL ATRESIA WITH DISTAL TRACHEOESOPHAGEAL FISTULA IN A 2KG INFANT WITH A RIGHT-SIDED AORTIC ARCH

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Purpose: A right-sided aortic arch in the setting of esophageal atresia with tracheoesophageal fistula (EA/TEF) is rare, with an incidence of approximately 5%. The preferred operative approach is not yet clear. The use of thoracoscopy by a right-sided approach in this setting has not been well described. We present a video of a right-sided thoracoscopic repair of an EA/TEF with a right-sided aortic arch.

Methods: The patient was born prematurely at 34 weeks and 2kg. In addition to the EA/TEF, he was found on echocardiogram to have a right-sided aortic arch with an aberrant left subclavian artery. On day of life two, he was taken for a rigid bronchoscopy and thoracoscopic repair of the EA/TEF. The patient was placed in a near-prone position after induction of anesthesia. A high-flow oscillating ventilator was utilized during the procedure. A 5mm port was placed just below the tip of the scapula, another 5mm port was placed in the mid-axillary line superior to the first port, and a 3mm port was placed in the mid-axillary line inferior to the first port. The distal esophagus was located underneath the aorta and was dissected up to the level of the fistula with the trachea where it was divided with clips. The azygous vein was spared. The proximal pouch was dissected free and then the anastomosis was completed with interrupted absorbable sutures.

Results: The procedure was well tolerated, and a post-operative esophagram demonstrated no leak. He was discharged at approximately two weeks and continues to do well at follow-up.

Conclusions: The right thoracoscopic approach for infants with a right-sided aortic arch in the setting of esophageal atresia with a tracheoesophageal fistula is technically feasible and affords for excellent anatomic visualization.

Video Session (cont.)

V6

THORACOSCOPIC REPAIR OF A LONG GAP ESOPHAGEAL ATRESIA WITH PROXIMAL FISTULA

Steven S. Rothenberg, MD, Bethany J. Slater, MD.
The Rocky Mountain Hospital for Children, Denver, CO, USA.

Purpose: This video demonstrates the technique of thoracoscopic mobilization and repair of a long gap esophageal atresia.

Methods: A 31 week 1.6 Kg infant was born with an apparent pure esophageal atresia. A G-tube was placed and a gap study was performed at 2 weeks of age which showed a 7 vertebral body gap. The infant was fed with bolus feeds and had a second gap study at 40 weeks gestation which showed a gap of 6 vertebral bodies. The patient was taken for repair at 41 weeks and 4.1 Kg. Rigid bronchoscopy was done at the beginning of the procedure and identified a proximal fistula. The patient was then placed in a modified prone position with the left side elevated 45 degrees. A 3 port technique (1-4mm, 1-3mm, 1-5mm) was used. CO2 insufflation at a pressure of 4 and flow of 1 L/min was used. A 4 mm 30 degree scope, 3mm instruments including a 3mm vessel sealer were used for the dissection. The upper pouch fistula was divided with a 5mm stapler and the anastomosis was performed using 5-0 PDS suture.

Results: The operation was completed successfully thoracoscopically and took 95 min. The patient was kept paralyzed and sedated for 7 days. A G-tube study at 7 days demonstrated no reflux and no leak, and the patient was extubated and feeds started. An esophagram at 2 weeks showed no leak

Conclusion: Thoracoscopic management of long gap esophageal atresia is feasible and safe. The increased visualization afforded by the thoracoscopic approach allows for maximal safe mobilization of the upper pouch, a key factor in achieving and anastomosis in a long gap. The upper pouch fistula can be safely managed thoracoscopically as well.

Video Session (cont.)

V7

A TECHNIQUE TO PREVENT BAR DISPLACEMENT IN THE NUSS PROCEDURE

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Tweet about it: How do you get the best outcomes for kids with pectus excavatum? @clairegravesmd shows how to prevent bar displacement with a simple Nuss modification!

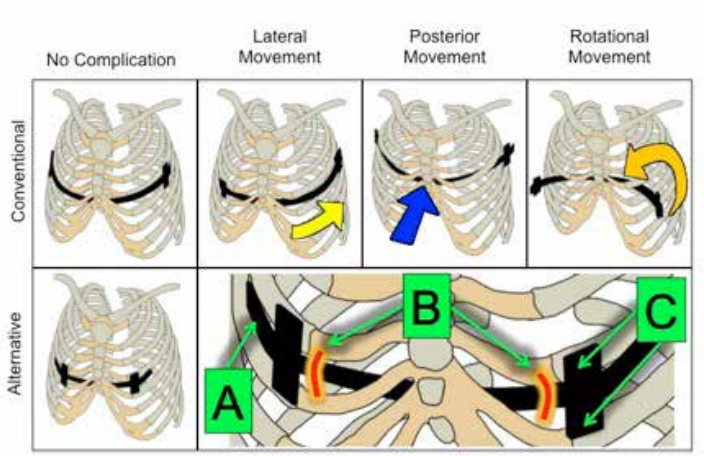
Purpose: Bar displacement is a serious complication of the Nuss procedure. Three types of displacement have been well described: lateral sliding, bar flipping and posterior disruption. We propose a simple modification in bar placement and fixation that safeguards against all three mechanisms of displacement.

Methods: Nuss bar length is chosen to extend just beyond the pectus ridge on each side. Using the external bar bender, we make a gentle curve on each side of the bar, corresponding to the peak of each pectus ridge. The ends of the bar are left straight. After the bar is inserted and flipped, a stabilizer is placed on each end and slid medially, just lateral to the chest wall insertion site. After the stabilizers are in position, in situ bar benders are used to complete the curvature of the bar around the chest wall.

Results: This technique addresses all three methods of displacement (Fig.1). Lateral sliding is prevented by locking the stabilizers in place with in situ bending just lateral to the chest exit site (A). The bar cannot move laterally as the stabilizers abut the chest wall exit site (B). Placing the stabilizers more medially positions them at the inflection point where the ribs angle superiorly. Thus the stabilizers straddle two ribs on the anterior chest (C). The stabilizers therefore have a broader base of support, preventing bar flipping. Finally, placing the stabilizers more anterior allows them to directly counteract the posterior pressure on the bar from the sternum. Instead of relying on the intercostal musculature, the ribs themselves serve to support the stabilizers and bar from posterior dislocation.

Conclusion: We report a technical modification of pectus bar placement and stabilization to minimize the risk of three common mechanisms of displacement.

Video Session (cont.)



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